THE MARINE REVIEW

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SHIP BUILDING ON THE LAKES

THE ship yards of the great lakes have twenty-nine vessels under construction for 1912 delivery, including seven passenger boats (three of these are little mission steamers, however, for service on Canadian rivers) three bulk freighters, one package freighter, two oil vessels, one conveying steamer, two coast freighters, two dredges, two light-house tenders, two light vessels, one sand sucker, two dump scows, one drill boat, one survey steamer, one tug and one floating dock. Of this program the American Ship Building Co. is building seven, the Great Lakes Engineering Works, five, Toledo Ship Building Co., one, Manitowoc Dry Dock Co., two, Johnston Bros. two, Collingwood Ship Building Co. two, Racine Boat Manufacturing Co. two, Kingston Ship Building Co. two, Polson Iron Works five and Davis Dry Dock Co. one.

Again sub-dividing the program the American Ship Building Co. is building two passenger boats, an oil steamer and barge, one package freighter, one conveying steamer for carrying and handling crushed stone and one bulk freighter for the coal trade. Of this program the oil barge No. 88 has already been launched. The Great Lakes Engineering Works is building two bulk freighters, two coast freighters and one dump scow. The Toledo Ship Building Co. is building a passenger boat; Johnston Bros., two dredges; the Collingwood Ship Building Co., a light-house tender and drill boat; the Racine Boat Manufacturing Co., two light vessels; the Kingston Ship Building Co., a light-house tender and survey steamer, the Polson Iron Works, a dredge, three small mission steamers and a floating dry dock; the Davis Dry Dock Co., a passenger steamer.

This is a program more varied than usual though in monetary value it by no means equals the programs of former years. The vessels most conspicuous by their absence are the bulk freighters, as was to be expected. This particular feature of lake construction has been somewhat overdone of late years and it will take a little while for the trade, naturally expansive, to digest it. However, the resourcefulness of the lake ship builder is apparent in the construction and launching program. He has gone to the coast for a considerable part of his work. The American Ship Building Co. has built, during the year, six oil vessels for the Standard Oil Co., and has under construction two more, while the Great Lakes Engineering Works has not only built six and has under construction two more but has remodeled eight vessels for coast service, and it is reported has closed contracts for two additional vessels for the Harper Transportation Co., of Boston, though verification of this order has not been obtained from the builders. Additional contracts are also in the air as a leading shipping interest is considering building three bulk freighters as well as two canal sized steamers for the rail trade. Moreover, the Cleveland & Buffalo Transit Co. will, within a month or two, close contracts for a new sidewheel steamer to cost approximately $1,500,000.

The three bulk freighters included in the 1912 program have a carrying capacity of 25,500 gross tons of ore in a single trip, or 510,000 tons in an average season of 20 trips. It will be observed in the launching table published elsewhere in this issue that five bulk freighters were launched in 1911, having a carrying capacity of 55,000 gross tons of ore in a single trip, or 1,100,000 tons in an average season of 20 trips. In the past ten years bulk freighters having a carrying capacity of 41,548,000 tons have been added to the lake fleet. The 1912 program, as so far announced, will increase this to 42,058,000 gross tons. This is greater than the ore movement of any single year with the exception of 1910, when 42,620,201 tons were moved by water. Comment is superfluous.

Altogether 42 vessels were launched on the great lakes during 1911, exclusive of Canadian tonnage. The list included nine bulk freighters (four for the coast) two coast package freighters, two passenger steamers, two oil steamers, five oil barges, eight tugs, one fuel lighter, one sand steamer, one car ferry, three tow boats, four scows, two light vessels, one river lighter and one car float.

The lake season of 1912 was reasonably free from accidents of a serious nature and the ship yards have not a great deal of repair work to do, not as much as usual though, of course, there is the possibility that some of the older vessels may be remodeled before the 1912 navigation season begins.

Vessels Under Construction in Lake Yards for 1912 Delivery

AMERICAN SHIP BUILDING CO.'S YARDS.

To be built at	Type or name.	Dimensions in feet. Over all.	Keel.	Beam.	Depth.	Dimensions of engines.	Boilers, dimensions in ft. and in.	Draft.	Steam pressure, lbs.	Capacity, gross tons.	For whom building.
Cleveland...	Pas. Str. Cy. of Grand Rapids.	310	291	48	27	25, 42, 51, 51 x 42	(6) 12.6 x 11.6	Ellis & Eaves	200	....	Graham & Morton Transportation Co., Chicago.
Lorain.....	Oil-burning Str.	390.5	373	52	25	23, 23½, 38, 63 x 42	(2) 15.4½x11.6	Howden	180	1,500,000 (gal.)	Standard Oil Co., New York
Detroit.....	Conv. Str.	436	416	54	29	19, 27½, 40, 58 x 42	(3) 11.6 x 11.6	Howden	210	5,000	Calcite Transportation Co., Detroit, Mich.
Port Arthur.	Pkg. Frtr.	257	244	42.6	26.6	18, 29, 48 x 40	(2) 11.6 x 11	Ellis & Eaves	180	3,000	J. W. Norcross & Co., Ltd., Toronto, Ont.
Detroit.....	Blk. Ftr.	257	244	43	21	18, 29, 48 x 40	(2) 12 x 11.6	Howden	170	3,000	George Hall Coal Co., Ogdensburg, N. Y.
Lorain.....	S. O. Bge. 88	260	250	43	23		11.6 x 11.6	Natural	130	1,000,000 (gals.)	Standard Oil Co., New York
Wyandotte.	Pas. Str. Cy. of Detroit III	470	455	55.4	22	62, 92, 92 x 102	See footnote.	Howden	160	....	Detroit & Cleveland Navigation Co., Detroit, Mich.

*Three single-ended; three double-ended. One 13.9 x 12 single-ended; one 13.9 x 22.7½ double-ended; two 14.8 x 12 single-ended and two 14.8 x 22.7½ double-ended.

GREAT LAKES ENGINEERING WORKS, DETROIT, MICH.

To be built at	Type or name.	Over all.	Keel.	Beam.	Depth.	Dimensions of engines.	Boilers, dimensions in ft. and in.	Draft.	Steam pressure, lbs.	Capacity, gross tons.	For whom building.
Ecorse.....	Blk. Ftr.	617	597	64	34	23, 33½, 48, 69 x 42	(3) 14.9 x 12.2	Great Lakes	220	14,000	Shenango Steamship & Transportation Co., Perry-Payne bldg., Cleveland
Ashtabula..	Blk. Ftr.	524	504	56	26	23, 37, 63 x 42	15 x 11.6	Great Lakes	180	8,500	Boland & Cornelius, Buffalo
Ecorse.....	Ftr. Yaguez	251	247	43	28	21, 35½, 58 x 42	14.2 x 11.6	Great Lakes	180	3,000	Ocean Frt. Line, Inc., New York.
Ecorse.....	Ftr. Bayamon	261	247	43	28	21, 35½, 58 x 42	14.2 x 11.6	Great Lakes	180	3,000	Ocean Frt. Line, Inc., New York.
Ashtabula	Dump scow	1[illegible]4	30.6	11.6							

TOLEDO SHIP BUILDING CO., TOLEDO, O.

To be built at	Type or name.	Over all.	Keel.	Beam.	Depth.	Dimensions of engines.	Boilers, dimensions in ft. and in.	Draft.	Steam pressure, lbs.	Capacity, gross tons.	For whom building.
Toledo.....	Pas. Str.	172.6	164	32	9.6	15, 30 x 20	12.6 x 10.6	Forced	150	....	Thousand Island Steamboat Co., Cape Vincent, N. Y.

MANITOWOC SHIP BUILDING & DRY DOCK CO., MANITOWOC, WIS.

To be built at	Type or name.	Over all.	Keel.	Beam.	Depth.	Dimensions of engines.	Boilers, dimensions in ft. and in.	Draft.	Steam pressure, lbs.	Capacity, gross tons.	For whom building.
Manitowoc..	Hull 49 Sand suck'r	170	161	36	10	16, 34 x 26	Scotch 12½ x 13	Natural	160	600 yds.	Lake Sand Co., Chicago.
Manitowoc..	Hull 48 Dump scow	1[illegible]5	...	36	12.6			——	...	750 yds.	Great Lakes Dredge & Dock Co., Chicago, Ill.

JOHNSTON BROS., FERRYSBURG, MICH.

To be built at	Type or name.	Over all.	Keel.	Beam.	Depth.	Dimensions of engines.	Boilers, dimensions in ft. and in.	Draft.	Steam pressure, lbs.	Capacity, gross tons.	For whom building.
Ferrysburg.	Dredge Natoma No. 10	150	...	56	10½			——	...	....	Natomas Consolidated of Calif., San Francisco.
Ferrysburg.	Dredge Natoma No. 8	150	...	56	10½			——	...	....	Natomas Consolidated of Calif., San Francisco.

COLLINGWOOD SHIP BUILDING CO., LTD., COLLINGWOOD, ONT.

To be built at	Type or name.	Over all.	Keel.	Beam.	Depth.	Dimensions of engines.	Boilers, dimensions in ft. and in.	Draft.	Steam pressure, lbs.	Capacity, gross tons.	For whom building.
Collingwood	Lighthouse Str. Estevan	212	200	38	17.6	(2) 15, 25, 42 x 26	2 Scotch 14 x 10.6	Howden	180	....	Canadian government.
Collingwood	Drill boat (steel)	80	80	28	4.6		1 Firebox, 7.6 x 12	Natural	140	....	The C. S. Boone Dredging & Construction Co., Ltd., Toronto.

RACINE BOAT MANUFACTURING CO., MUSKEGON, MICH.

To be built at	Type or name.	Over all.	Keel.	Beam.	Depth.	Dimensions of engines.	Boilers, dimensions in ft. and in.	Draft.	Steam pressure, lbs.	Capacity, gross tons.	For whom building.
Muskegon..	Lgt. Vessel No. 82	105	89	21	14	14 x 14	Firebox, 5 x 9.6	Natural	110	180	Light House Bureau.
Muskegon..	Lgt. Vessel No. 95	120	105	24	16	18 x 20	2 Scotch 9.6 x 10	Natural	110	330	Light House Bureau.

KINGSTON SHIP BUILDING CO., LTD., KINGSTON, ONT.

To be built at	Type or name.	Over all.	Keel.	Beam.	Depth.	Dimensions of engines.	Boilers, dimensions in ft. and in.	Draft.	Steam pressure, lbs.	Capacity, gross tons.	For whom building.
Kingston...	Lighthouse tender Dollard	184	...	..	..	2 triple expansion	2 Scotch	Natural	...	....	Canadian government.
Kingston...	Surv. Str. Bellechasse	142	...	..	..	2 triple expansion	2 Scotch	Howden	...	....	Canadian government.

POLSON IRON WORKS, LTD., TORONTO, ONT.

To be built at	Type or name.	Over all.	Keel.	Beam.	Depth.	Dimensions of engines.	Boilers, dimensions in ft. and in.	Draft.	Steam pressure, lbs.	Capacity, gross tons.	For whom building.
Toronto....	Tug	70	66.6	17	9	16 x 18	Scotch	Natural	...	....	City of Toronto.
Toronto....	Sidewheeler	40	...	10.3	3.7½	5 x 6	10 x 10	Natural	...	....	Bishop Breyret R. C. Mission, McKenzie river.
Toronto....	Sidewheeler	40	...	10.3	3.7½	6 x 7	42 x 52	Natural	...	....	Bishop Breyret R. C. Mission, McKenzie river.
Toronto....	Sidewheeler	45	...	9.3	..	(Steel frame only.)	45 x 65			.	Anglican Church Mission, Great Slave Lake.
Toronto....	Floating d'k.	150	...	100	35		Elec. drive			2 sec. 4,500	Polson Dry Dock & Ship Building Co., Toronto.

DAVIS DRY DOCK CO., KINGSTON, ONT.

To be built at	Type or name.	Over all.	Keel.	Beam.	Depth.	Dimensions of engines.	Boilers, dimensions in ft. and in.	Draft.	Steam pressure, lbs.	Capacity, gross tons.	For whom building.
Kingston..	Pass. and Frt. Str.	112	...	25	..	Fore and aft compound	Fitzsimmons boiler	----	...	500	Ottawa Forwarding Co., Ottawa, Ont.

WORK IN COAST SHIPYARDS

New York Ship Building Co., Camden, N. J.

Sidewheel passenger steamer Washington Irving for Hudson River Day Line, New York, 414 ft. long, 86 ft. beam.

Battleship Moreno for Argentine Republic, 595 ft. over all, 27,600 tons displacement; Curtis turbines, triple-screw; Babcock & Wilcox boilers; estimated horsepower, 45,000.

Cruiser for Chinese government, 320 ft. over all; 2,600 tons displacement; Parsons turbines, three screws; express type of boilers; estimated horsepower, 8,000.

Hull of side-wheeler Alameda for Southern Pacific Co., 275 ft. over all; gross tonnage, 2,000.

Two car floats for New York Central & Hudson River railroad; length, over all, 332 ft.; gross tonnage, 1,000.

Two oil steamers for Standard Oil Co., 342 ft. over all; gross tonnage, 3,500; triple-expansion, single-screw engine; Scotch boilers, estimated horsepower, 1,300.

Oil steamer for Gulf Refining Co., 406 ft. over all; estimated gross tonnage, 5,200; triple-expansion, single-screw engine; Scotch boilers; estimated horsepower, 2,650.

The Moran Co., Seattle, Wash.

Steel steam whaler Star I, 117 ft. over all, for United States Whaling Co.; estimated gross tonnage, 180; three-cylinder, triple-expansion engine, one single-end Scotch boiler; estimated horsepower, 500.

Two steel steam whalers, Star II and Star III, for United States Whaling Co.; length over all, 105 ft.; gross tonnage, 150; estimated horsepower, 400; machinery same as for Star I.

Two steel steam whalers, Yard No. 66 and Yard No. 67, for Canadian North Pacific Fisheries Co.; length over all, 96 ft.; gross tonnage, 130; three-cylinder, triple-expansion engine, one single-end Scotch boiler; estimated horsepower, 375.

Steel passenger steamer Solduck for Inland Navigation Co.; length over all, 205 ft.; gross tonnage, 1,160; three-cylinder, triple-expansion engine; two Ballin water-tube boilers; estimated horsepower, 1,400.

The Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, Pa.

Three steel coal barges for Lehigh Valley Railroad Co., Jersey City, N. J., 160 ft. over all; dead weight carrying capacity, 988 gross tons; equipped with donkey boiler.

Three steel coal barges (sail) for Lehigh Valley Railroad Co., 175 ft. long; dead weight carrying capacity, 1,291 gross tons; equipped with donkey boiler.

Steel cruiser Cuba for Cuban government, 200 ft. over all, 2,055 gross tons displacement; triple-expansion, twin-screw engines, two water-tube boilers; 2,400 estimated horsepower.

Steel gunboat Patria (sails) for Cuban government, 185 ft. over all; 1,200 tons displacement; triple-expansion, twin-screw engines, two water-tube boilers; estimated horsepower, 1,300.

Fore River Ship Building Co., Quincy, Mass.

Two steam trawlers for Bay State Fishing Co., 128 ft. long, of 283 gross tons; approximate value, $70,000; triple-expansion engine, one Scotch boiler; estimated horsepower, 450.

Suction dredge New Orleans for the war department, 315 ft. over all; approximate value, $400,000; four triple-expansion engines, four Babcock & Wilcox boilers; estimated horsepower, 2,500.

Battleship Rivadavia for Argentine Republic, 585 ft. over all, 30,200 full load displacement; approximate value, $11,000,000; three Curtis marine turbines, 18 Babcock & Wilcox boilers; estimated horsepower, 40,000.

Newport News Ship Building & Dry Dock Co., Newport News, Va.

Freight steamer for A. H. Hull Steamship Co., 8-10 Bridge St., New York; length over all, 328 ft.; estimated gross tonnage, 3,500; single-screw, triple-expansion engine; two Scotch boilers; estimated horsepower, 1,200.

Freight and passenger steamer, 397 ft. over all, for Clyde Steamship Co., Philadelphia, Pa.; estimated gross tonnage, 6,000; single screw, triple-expansion engine; four Scotch boilers; estimated horsepower, 3,600.

Maryland Steel Co., Sparrows Point, Md.

Two colliers, Orion and Jason, for United States navy department.

Five steel steam freight ships, all duplicates, for American-Hawaiian Steamship Co., New York; length over all, 429 ft. 2 in.; estimated gross tonnage, 6,600; quadruple, single-screw engines; three Scotch boilers; estimated horsepower, 3,000.

Southern Pacific Co., West Oakland Yards, West Oakland, Cal.

Side-wheel, double-end team and passenger ferry steamer Thoroughfare, for Southern Pacific Co., San Francisco, Cal.; length over all, 273 ft.; approximate value, $170,000; estimated gross tonnage, 2,662; two (condensing) tandem compound engines; two Scotch dryback boilers; estimated horsepower, 1,340.

Stern wheel river steamer (freight) Cherokee, 175 ft. over all, for Southern Pacific Co., San Francisco, Cal.; approximate value, $48,500; estimated gross tons, 429; two non-condensing, compound, horizontal engines; one locomotive firebox boiler; estimated horsepower, 325.

Harlan & Hollingsworth Corporation, Wilmington, Del.

Steel lumber and passenger steamer California, for Olson & Mahoney, Fife building, San Francisco, Cal.; length over all, 250 ft. 11 in.; estimated gross tonnage, 1,580; one triple-expansion engine, single-screw, two cylindrical return tube boilers; estimated horsepower, 1,200.

Side-wheel excursion steamer for Nantasket Beach Steamboat Co., Boston, Mass.; length over all, 215 ft.; estimated gross tonnage, 900; one inclined compound engine, being built by W. & A. Fletcher Co., Hoboken, N. J.; two Scotch marine type boilers; estimated horsepower, 1,400.

Coastwise freight steamship (steel) for Baltimore & Carolina Steamship Co., Baltimore, Md.; length over all, 241 ft.; estimated gross tonnage, 1,870; one triple-expansion engine, single-screw; two cylindrical return tube boilers; estimated horsepower, 850.

The Harlan & Hollingsworth Corporation, Wilmington, Del., is also building outfits of engines, pumps, machinery, piping, boilers, etc., for wooden hulls which are being built by various wooden ship building yards, as follows:

For wooden hull of fishing steamer being built by M. M. Davis, Solmons, Va., for the Edwards Co., Inc., Reedville, Va.

For wooden hull of fishing steamer being built by John Abbott, Milford, Del., for Lewes Fisheries Co., Lewes, Del.

For wooden hull being built by American Car & Foundry Co., Wilmington, Del., for the Taft Fishing Co., Kilmarnock, Va.

For wooden hull being built by American Car & Foundry Co., Wilmington, Del., for C. E. Davis Packing Co., Fleeton, Va.

Also the following engines and boilers:

One fore and aft compound engine,

495 H. P., for Philip Wever & Son, Baltimore, Md.

Two triple-expansion engines, 500 H. P. each, for the Pusey & Jones Co., Wilmington, Del.

One cylindrical return-tube marine boiler, 730 H. P., for John W. Sullivan Co, New York.

One cylindrical return tube marine boiler, 495 H. P., for Philip Wever & Son, Baltimore, Md.

Two cylindrical return tube marine boilers, 105 H. P. each, for Light Vessel No. 53, department of commerce and labor.

One cylindrical return tube marine boiler, 400 H. P., for National Fireproofing Co., New York.

Two cylindrical return tube marine boilers, 318 H. P. each, for dredge Port Arthur, for Ellicott Machine Co., Baltimore, Md.

One cylindrical return tube marine boiler, 357 H. P., for the Pusey & Jones Co., Wilmington, Del.

Staten Island Ship Building Co., Port Richmond, S. I., N. Y.

Steel tugboat (Hull No. 490) for Lehigh Valley Railroad Co.; length over all, 105 ft.; estimated gross tonnage, 229; fore and aft compound, single-screw engine; Scotch boilers; estimated horsepower, 700.

Steel tugboat (Hull No. 553) for Baltimore & Ohio Railroad Co.; length over all, 118 ft.; estimated gross tonnage, 220; fore and aft compound, single screw engine; Scotch boiler; estimated horsepower, 800.

Steel oil barge (Hull No. 554) for Standard Oil Co.; length over all, 208 ft.; estimated gross tonnage, 925; oil engine; estimated horsepower, 300.

Wooden steam lighter (Hull No. 555) for General Lighterage Co.; length over all, 109 ft.; estimated gross tonnage, 244; fort and aft, single-screw engine; Scotch boiler; estimated horsepower, 300.

Steel gasoline motor launch (Hull No. 557) for Standard Oil Co.; length over all, 98 ft.; estimated gross tonnage, 120; standard gasoline engine; estimated horsepower, 100.

Open deck steel lighter (Hull No. 558) for New York Central & Hudson River Railroad Co.; length over all, 112 ft.; estimated gross tonnage, 355; fore and aft, single-screw engine; Scotch boiler; estimated horsepower, 400.

Steel house lighter (Hull No. 559) for New York Central & Hudson River Railroad Co.; length over all, 114 ft.; estimated gross tonnage, 419; fore and aft, single-screw engine; Scotch boiler; estimated horsepower, 400.

Willamette Iron & Steel Works, Portland, Ore.

Non-propelling steel suction dredge with 30-in. centrifugal pump for the port of Portland, Ore.; length over all, 206 ft. 3 in.; approximate value, $235,000; main pumping engine 21, 34½, 40-40-24 in.; estimated horsepower, 1,500.

The Johnson Iron Works, Ltd., Julia and Water Sts., New Orleans, La.

Steel barge, 100 ft. over all, for New Orleans Coal Co.

Four steel barges, duplicates, 50 ft. over all, for Central America.

Two wooden gasoline launches, duplicates, 45 ft. over all, for Central America; estimated horsepower, 36.

Spedden Ship Building Co., Baltimore, Md.

Steel steam sea-going tug Neptune, for Curtis Bay Towing Co., Baltimore, Md.; length over all, 121 ft.; approximate value, $90,000; estimated gross tonnage, 237; triple-expansion, single-screw engine, 775 H. P.

Steel fishing steamer Waldo Newcomer, for The Edwards Co., Reedville, Va.; length over all, 151 ft.; approximate value, $60,000; estimated gross tonnage, 338; triple expansion, single-screw engine, 850 H. P.

Steel barge Argo, for Independent Pier Co., Philadelphia, Pa.; length over all, 130 ft.; approximate value, $20,000; estimated gross tonnage, 240; no power.

John H. Dialogue & Son, Camden, N. J.

Steel tug Caspian, for Capt. P. Martin, Philadelphia, Pa.; length over all, 92 ft.; approximate value, $38,000; estimated gross tonnage, 135; compound engine and one leg boiler; estimated horsepower, 300.

Steel tug No. 453, 150 ft. 6 in. over all; approximate value, $80,000; estimated gross tonnage, 400; triple-expansion engine, one Scotch boiler; estimated horsepower, 900.

Union Iron Works Co., San Francisco, Cal.

Steamer Kilanea, 250 ft. over all, for Inter-Island Steam Navigation Co., Honolulu, H. I.; approximate value, $350,000; estimated gross tonnage, 1,338; four-cycle, triple-expansion engine; four Scotch boilers; estimated horsepower, 2,600.

Gas Engine & Power Co. and Charles L. Seabury & Co., Cons., Morris Heights, N. Y.

Steel hull, No. 2,286, for Wm. Wrigley Jr., Chicago, Ill.; length over all, 70 ft.; estimated gross tonnage, 35; twin-screw Speedway gasoline engine; estimated horsepower, 100.

Wooden hull, No. 2,290, 70 ft. over all; estimated gross tonnage, 35; twin-screw Speedway gasoline engine; estimated horsepower, 130.

Wooden hull, No. 2,284, for F. G. Bourne, New York; length over all, 60 ft.; estimated gross tonnage, 25; single-screw gasoline engine; estimated horsepower, 200.

Also small wooden launches ranging from 21 ft. to 53 ft. over all length, aggregating 35 gross tons, equipped with Speedway gasoline engines of 300 H. P.

Waters-Colver Co., West New Brighton, S. I., N. Y.

Steam wooden light-house tender Woodbine for United States government; length over all, 95 ft.; approximate value, $24,000; estimated gross tonnage, 62¼; triple-expansion, single-screw engine; one Almy water-tube boiler; estimated horsepower, 200.

Bath Iron Works, Bath, Me.

Four destroyers for United States government.

Two Scotch boilers for two steam trawlers building at Fore River Ship Building Co.'s yard, 12 ft. 6 in. diameter by 10 ft. 5 in. long.

One Scotch boiler for tug Roger Williams, of Providence, 12 ft. 2 in. diameter by 11 ft. 2 in. long.

The Brewer Dry Dock Co., Mariner Harbor, S. I., N. Y., have built, for their own use, a balance dry dock of modern construction of 1,500 tons deadweight lifting capacity, 210 ft. long on keel track, with 18 ft. of water over keel blocks, and with a width in the clear of 60 ft.

The Bath Iron Works, Bath, Me., have just completed a new brass foundry, pipe shop, sheet metal shop, and coppersmith shop of steel, concrete and glass, and during the year 1912 will build new blacksmith and anglesmith shops of concrete.

George C. Walker, Toledo, Ore.

Wooden sail and fishing vessel, 52 ft. over all, for Capt. John Hall, Portland, Ore.; approximate value, $4,700; estimated gross tonnage, 15; gasoline engine, 25 H. P.

Two steam barges, 190 ft. long, 40 ft. beam, for Fir & Spruce Lumber Manufacturing Co., Toledo, Ore.; twin-screw engines; carrying capacity, 600,000 ft. lumber; approximate cost, $82,000 each. Machinery to be built by Marine Iron Works, Chicago, Ill.

Ferry steamer, 100 ft. long, 22 ft. deep, for Newport Navigation Co.,

of Newport, Ore., Capt. John Marshall; approximate value, $11,000.

Also six fishing dories and one small gasoline launch.

Thomas M. Favre, Gulfport Ship Yard Gulfport, Miss.

Two barges for river work, 134 ft. by 34 ft., for government of Vicksburg, Miss.; approximate value, $15,000.

Hartford & New York Transportation Co., Hartford, Conn.

Wooden barge H. & N. Y. T. Co. No. 31, for Hartford & New York Transportation Co., Hartford, Conn.; length over all, 160 ft.; approximate value, $16,000; estimated gross tonnage, 500.

F. S. Bowker & Son, Phippsburg, Me.

Three-masted wooden schooner Edward R. Smith, 160 ft. over all, for Rogers & Webb, Boston, Mass.; approximate value, $34,000; estimated gross tonnage, 565; gasoline engine to do hoisting

Also a duplicate of the above.

Charles L. Rohde & Sons, Boston St., Baltimore, Md.

One wooden pile driver, 60 ft. over all, for Andrew Miller.

One wooden open lighter, 100 ft. over all, for M. W. Adams.

One wooden sand dredge, 95 ft. over all, for Arundel Sand & Gravel Co.

One wooden derrick machine, 90 ft. over all, for Joseph R. Foard Co.

One wooden open lighter, 92 ft. over all, for M. W. Adams.

One wooden covered lighter, 80 ft. over all, for Atlantic Transport Co.

Two wooden open lighters, 85 ft. over all, for M. W. Adams.

One wooden suction dredge, 115 ft. over all, for Ellicott Machine Co.

Two wooden open lighters, 80 ft. over all, for Potomac Sand Co., Washington, D. C.

One wooden open lighter, 107 ft. over all, for Joseph R. Foard Co.

One wooden open lighter, 92 ft. over all, for M. W. Adams.

Arthur D. Story, Essex, Mass.

Schooner Flora L. Oliver, for Capt. Victor Oliver and others, of Gloucester, Mass.; length over all, 115 ft.; approximate value, $12,000; estimated gross tonnage, 115.

Schooner, 125 ft. over all, for Capt. Sylvester Whalen, of Boston, Mass.; approximate value, $15,000; estimated gross tonnage, 140.

Gasoline vessel, 75 ft. over all, for Capt. W. J. Corkum, of Everett; approximate value, $8,500; estimated gross tonnage, 50; standard engine, 50-65 H. P.

Schooner, 105 ft. over all, for Capt. John Silveria and others, of Gloucester; approximate value, $11,500; estimated gross tonnage, 105.

Schooner, 118 ft. over all, for builder's account; approximate value, $15,000; estimated gross tonnage, 146.

Kelley-Spear Co., Bath, Me.

Coal barges Fall River, Bristol and Boston, all duplicates, for Staples Transportation Co. Fall River, Mass.; length over all, 271 ft.; approximate value, $70,000; estimated gross tonnage, 1,750.

Smith & McCoy, 205 Water Ave., Norfolk, Va.

Wooden fishing steamer, W. L. Messick, for Carter Cook Fish Guano Co.; length over all, 140 ft.; approximate value, $42,000; estimated gross tonange, 240; compound single screw engine, 500 H. P.

Seaford Marine Railway Co., Seaford, Del.

Schooner Mary S. Eskridge, for W. W. Griffith, Seaford, Del.; length over all, 147 ft.; approximate value, $27,000; estimated gross tonnage, 378.

Barge, 192 ft. over all; approximate value, $18,000; estimated gross tonnage, 495.

Skinner Ship Building & Dry Dock Co., Baltimore, Md.

Steel steam tug, 115 ft. over all, for Hartford & New York Transportation Co.; compound single-screw engine and Scotch boiler, 900 H. P.

Marine Machinery Under Construction

Almy Water Tube Boiler Co., Providence, R. I.

Two boilers for steam yacht building at yard of the Pusey & Jones Co., Wilmington, Del., for F. C. Fletcher.

Two boilers for steam yacht Florence (formerly Czarina) of Toronto.

One boiler for steamer Sylvia, of Springfield, Mass.

One boiler for fishing tug at Anacortes, Wash.

One boiler for steam yacht Ellide, Lake George, N. Y.

The E. J. Codd Co., Baltimore, Md.

One 15 x 30 x 24 in. fore and aft compound engine, and one three-furnace Scotch boiler, 550 H. P., for a fishing steamer building by Henry Brusstar, Weems, Va., for Bellows & Squires.

One 16½ x 33 x 24 in. fore and aft compound engine and one three-furnace Scotch boiler, 650 H. P., for fishing steamer building by E. J. Tull, Pocomoke, Md., for Bellows & Squires.

One 15 x 30 x 24 in. fore and aft compound engine and one three-furnace Scotch boiler for a fishing steamer building by W. E. Woodall & Co., Baltimore, Md., for the Coan River Guano Co.

W. & A. Fletcher Co., Hoboken, N. J.

One compound inclined surface condensing engine, 31 in. x 56 in. x 8 ft. 6 in., for steel paddle steamer Rose Standish, building by Harlan & Hollingsworth Corporation, Wilmington, Del., for the Nantasket Beach Steamboat Co.

One double compound, four-cylinder engine, 19 x 38 x 28 in., for ferryboat Niagara, building by T. S. Marvel Shipbuilding Co., Newburgh, N. Y., for New York Central lines.

The Portland Co., Portland, Me.

One triple-expansion engine, 15, 22 and 36 x 24 in., for pogy steamers Wm. B. Murray and Amagansett, building for C. A. Sickler & Bro., New York City, at yard of Cobb, Butler & Co., Rockland, Me.

United Engineering Works, San Francisco, Cal.

Triple-expansion engine, 13 x 22 x 36 x 24 in., and complete machinery installation for steamer Daisy Gadsby, building by Matthews Shipbuilding Co., Hoquiam, Wash., for S. S. Freeman Co., San Francisco, Cal.

One fore and aft compound marine engine, 11 x 25 x 16 for tow boat building at Hall's ship yard for Northwestern Fisheries Co., Seattle, Wash.

Steel hull and auxiliary machinery for Standard Oil Co.'s boat Petroleum No. 2. Hull, 117 ft. x 20 ft. x 12 ft. Engines, four-cylinder, four-cycle, 12 x 14 Union gas engine.

Quintard Iron Works Co., Foot of Twelfth St., E. R., New York.

New set of boilers in steamer Richard Peck.

Union Gas Engine Co., 503 Mission St., San Francisco, Cal.

One 250 H. P. four-cylinder distillate engine for Standard Oil Co.'s barge Petroleum, now building at the United Engineering Works.

One 140 H. P. three-cylinder distillate engine for the Banning Co., of Avalon.

Twin screw engines of 100 H. P. each are being constructed for the Meteor Boat Co. They will be installed in a glass bottom boat to be used at Avalon.

Three-cylinder, 50 H. P. kerosene Union and a 3 H. P. electric light

plant for schooner Manua now building at H. Anderson shipyards, of South San Francisco.

One 80 H. P. three-cylinder Union engine for schooner Senator, of Seattle.

One 50 H. P. three-cylinder Union engine for schooner Chillcoot.

Iowa Machine Works, Clinton, Ia.

One 16-in. direct connected dredge pump with forward and aft triple-expansion engine for U. S. dredge Waterway. Also electric light plant, refrigerator plant, hoisting and swinging winches and capstans. Dubuque Boat & Boiler Works, Dubuque, Ia., are building the hull, boilers and cabin work.

Machinery for two steel tow boats, to be equipped with cross compound condensing propelling engines, electric light plant, steam steering gear, steam capstans. Hulls building by Dubuque Boat & Boiler Works.

Collingwood Ship Building Co., Collingwood, Ont.

In addition to the vessel construction program of the Collingwood Ship Building Co., Ltd., noted elsewhere in this issue, this company has on hand considerable engineering work. It is building the machinery for the survey steamer Bellechasse and lighthouse tender Dollard, now under way at the yard of the Kingston Ship Building Co., Ltd., Kingston, Ont., viz.:

For the Bellechasse:—Two triple-expansion engines, 12½, 21 and 34 in. by 26-in. stroke, 180 lb. steam pressure; two Scotch marine boilers, 11 ft. 6 in. diameter by 10 ft. 6 in. long, 180 lb. pressure; Howden draft.

For the Dollard:—Two triple-expansion engines, 12½, 21 and 34 in. by 26-in. stroke, 180 lb. pressure; two Scotch boilers, 12 ft. diameter by 10 ft. 6 in. long, 180 lb. steam pressure; natural draft.

Also one Scotch marine boiler, 15 ft. 6 in. diameter by 10 ft. 6 in. long, 180 lb. steam pressure, for steamer Paliki.

Ship Yard Notes

The Charles Barnes Co., Cincinnati, O., is building three steamers, duplicates, for the U. S. engineers' department, 137 ft. long and 30 ft. beam.; high pressure balanced valve lever engines and Bonson boilers; electric lighting plant of 10 kilowatt capacity; four sets of capstan engines, two on forecastle and two aft of boiler. One pair of high pressure balanced valve lever engines and a Bonson boiler for a river tow boat for the T. J. Hall Towing Co., of Cincinnati.

The New Burrell-Johnson Iron Co., Ltd., Yarmouth, N. S., is building a small steamer, 85 ft. long, 20 ft. deep, for Charles T. White & Sons, East Apple river, N. S. Boat is to be supplied with one 13 and 26 by 18 fore and aft surface condensing engine, having air, feed and bilge pumps worked by the low pressure cross head. An independent circulating pump is to be supplied and steam furnished by a boiler 9 ft. diameter by 9 ft. long, having two 36-in. corrugated furnaces. This company has just completed the freight and passenger steamer Robert G. Cann, 124 ft. long, 25 ft. beam and 9 ft. deep. She has sleeping accommodations for about 30 passengers, is lighted throughout by electricity and is equipped with a steam steering engine. The engine room telegraph is connected with the pilot house, and the boat is propelled by one 15 and 32 by 24 fore and aft surface condensing marine engine, steam being supplied by a boiler 11 ft. 3 in. diameter by 10 ft. long, at a pressure of 135 lb.

The Phoenix Foundry & Locomotive Works, St. John, N. B., has under construction a 15-in. suction dredge for the department of public works, Ottawa, Can. The dredge is for use on the St. John river and is of steel, about 110 ft. long by 30 ft. beam. The 15-in. pump is operated by triple-expansion engines with cylinders 8¼ in. and 13½ in. and 22 in. by 16 in. stroke; steam supplied by return tubular boiler, 10 ft. diameter by 12 ft. long, working pressure of 160 lb. The contract also includes 30 steel pontoons, 30 ft. long, 10 ft. wide and 2 ft. deep.

The Lockwood Mfg. Co., East Boston, Mass., has considerable repair work on hand and has been busily engaged in this kind of work for some months past, having recently completed repairs on the steamers Gov. Dingley, Gov. Cobb, Massachusetts, General Batchelder, Miles Standish, South Shore and Light Vessel No 73.

A. Blumer, Moss Point, Miss., has just completed a 13 x 13 link motion marine engine with all other parts, such as shaft, stern bearing, etc., for the tug Violet H., of New Orleans.

P. Delaney & Co., Newburgh, N. Y., manufacturers of marine boilers, are constructing the boilers which will go into the new municipal boat for the city of Boston, Mass.

Lake Launchings During 1911

During 1911, exclusive of Canadian yards, lake ship yards launched forty-two vessels, of which nine were bulk freighters (four for coast service), two package freighters for coast service, two passenger steamers, two oil steamers, five oil barges, eight tugs, one fuel lighter, one sand steamer, one car ferry, three tow boats, four scows, two light vessels, one river lighter and one car float. Of this program the American Ship Building Co. launched 19, of which four were bulk freighters, two passenger boats, four fish tugs, two oil steamers, five oil barges, one sand steamer and one fuel lighter. The Great Lakes Engineering Works launched seven vessels, of which five were bulk freighters (one for the lakes and four for the coast), and two coast package freighters. The Toledo Ship Building Co. launched four, a car ferry for the lakes and three tow boats intended for service on the Ohio river. The Manitowoc Dry Dock Co. launched four, two dump scows, a car float and river lighter. Johnston Bros. launched five, three tugs and two scows. The Racine Boat Mfg. Co. launched two light vessels, and Riebolt & Wolter a fishing tug.

The five lake bulk freighters have a carrying capacity of 55,000 gross tons of ore in a single trip or 1,100,000 tons in an average season of 20 trips.

During 1910, exclusive of Canadian yards, lake ship yards launched 51 vessels, of which 20 were bulk freighters, three package freighters, two passenger steamers, three car ferries, one river ferry, one lumber steamer, 12 tugs, three lighters, one lighthouse tender, one sand sucker, two dump scows and two gold dredges. Of this program the American Ship Building Co. launched 24, of which 10 were bulk freighters, one passenger boat, six tugs, three package freighters, two car ferries, one river ferry and one lighter. The Great Lakes Engineering Works launched nine bulk freight-

ers; the Toledo Ship Building Co. one lumber steamer; the Manitowoc Dry Dock Co. two lighters, one sand sucker and two dump scows; the Racine Boat Mfg. Co., one lighthouse tender; Johnston Bros., five fish tugs and two gold dredges; and Robert Curr, at Cleveland, built and launched a tug from Murphy & Donnelly's boiler shop.

The 20 bulk freighters have a carrying capacity of 194,500 gross tons in a single trip, or 3,890,000 gross tons in an average season of 20 trips.

During 1909, the lake ship yards, exclusive of Canadian yards, launched 39 vessels, of which 17 were bulk freighters, five were package freighters, five passenger steamers, six tugs, five lighters and one survey boat.

During 1908, exclusive of Canadian yards, lake ship yards launched 39 vessels, of which 24 were bulk freighters, two passenger boats, one package freighter, three tugs, three fire boats, one lightship, two drill boats, one sand sucker and one supply boat.

These 24 bulk freighters have a carrying capacity of 101,400 tons on a single trip, or 2,028,000 tons in an average season.

During 1907 the lake ship yards, exclusive of Canadian yards, launched 56 vessels, of which 40 were bulk freighters, three package freighters, one passenger steamer, one wrecker, one lighter, one mail boat, five tugs and four scows. These 40 bulk freighters have a carrying capacity of 368,000 gross tons on a single trip. However, as one of the new steamers, the Cyprus, sank on her second trip, the net addition of that year was 361,000, or 7,220,000 tons in an average season.

During 1906, the ship builders of the great lakes, exclusive of the Canadian yards, launched 47 vessels, of which 40 were bulk freighters, two passenger steamers, two package freighters, two car ferries and one sand dredge. The 40 bulk freighters have a carrying capacity of 381,000 tons on a single trip, or 7,620,000 gross tons in a average season of 20 trips.

During 1905, the ship builders of the great lakes launched 32 steamers, of which 29 were bulk freighters, two package freighters and one car ferry. These 29 bulk freighters have 260,200 gross tons carrying capacity on a single trip, or 5,204,000 gross tons in an average season of 20 trips.

During 1904 lake ship yards launched 13 vessels, of which seven were bulk freighters, two package freighters, one car ferry and three passenger steamers. The seven bulk freighters have a carrying capacity of 51,300 tons on a single trip, or 1,026,000 in an average season of 20 trips.

During 1903, lake ship yards launched 50 vessels, of which 42 were bulk freighters, five car ferries and three passenger steamers. These 42 bulk freighters have a carrying capacity of 213,250 tons on a single trip or 4,265,000 tons in an average season of 20 trips. It should be stated, however, that ten of the freighters were built by Mr. Wolvin for St. Lawrence river trade and are actively engaged in that service, but as they are available for the ore trade, they have been classed as bulk freighters with an average capacity of 3,000 tons each on 18-ft. draught.

During 1902, the lake ship yards launched 41 vessels, of which 32 were bulk freighters (two of them barges), two passenger steamers, three package freighters, two car ferries and two vessels for salt water service. These 32 bulk freighters have a carrying capacity of 171,910 tons on a single trip, or 3,438,200 tons in an average season of 20 trips. The particulars of vessels launched during 1911 will be found in the accompanying tables:

AMERICAN SHIP BUILDING CO.'S YARDS.

Where Built.	Type.	Name of Vessel.	Length over all. ft.	Carrying capacity, gross tons.	Name and Address of Owner.
Lorain	Bulk Frtr.	W. C. Agnew	552	10,000	Buffalo Steamship Co., John Mitchell, Cleveland, mgr.
Lorain	Bulk Frtr.	Thomas Walters	600	12,000	Jones & Laughlin Steel Co., Pittsburgh, Pa.
Wyandotte	Pass. Str.	Put-in-Bay	240	......	Ashley & Dustin, Detroit.
Buffalo	Fuel lighter	Pittsburgh	164	......	Pittsburgh Coal Co., Cleveland.
Lorain	Bulk Frtr.	Quincy A. Shaw	524	9,000	M. A. Hanna & Co., Cleveland, manage s.
Lorain	Fish tug	Pittsburgh	70	.....	Booth Fisheries Co., Chicago.
Lorain	Fish tug	Philadelphia	70	.....	Booth Fisheries Co., Chicago.
Lorain	Fish tug	Baltimore	70	.....	Booth Fisheries Co., Chicago.
Lorain	Fish tug	New York	70	.....	Booth Fisheries Co., Chicago.
Cleveland	Oil Str.	Perfection	260	800,000 (gal.)	Standard Oil Co., New York.
Superior	Sand Str.	C. W. Cadwell	164	....	Cadwell Transit Co., Duluth, Minn.
Lorain	Bulk Frtr.	The Harvester	545	10,000	Wisconsin Steel Co., Chicago.
Cleveland	Oil barge	S. O. No. 87	260	1,000,000 (gal.)	Standard Oil Co., New York.
Cleveland	Oil Str.	Ecorse	260	800,000 (gal.)	Standard Oil Co., New York.
Wyandotte	Pass. Str.	City of Detroit III	470	....	Detroit & Cleveland Navigation Co., Detroit.
Lorain	Oil barge	S. O. No. 120	258	1,000,000 (gal.)	Standard Oil Co., New York.
Lorain	Oil barge	S. O. No. 121	258	1,000,000 (gal.)	Standard Oil Co., New York.
Lorain	Oil barge	S. O. No. 122	258	1,000,000 (gal.)	Standard Oil Co., New York.
Lorain	Oil barge	S. O. No. 88	260	1,000,000 (gal.)	Standard Oil Co., New York.

GREAT LAKES ENGINEERING WORKS, DETROIT, MICH.

Ecorse	Bulk Frtr.	Col. James M. Schoonmaker	617	14,000	Shenango Steamship & Transportation Co., Pittsburgh.
Ecorse	Bulk Frtr.	Penobscot	261	3,400	Harper Transportation Co., Boston, Mass.
Ecorse	Bulk Frtr.	Seaconnet	261	3,400	Harper Transportation Co., Boston, Mass.
Ecorse	Bulk Frtr.	F. J. Lisman	261	3,400	Harper Transportation Co., Boston, Mass.
Ecorse	Bulk Frtr.	M. E. Harper	261	3,400	Harper Transportation Co., Boston, Mass.
Ecorse	Gen. Frtr.	Grayson	261	3,800	Ocean Freight Line, Inc., New York.
Ecorse	Gen. Frtr.	Borinquen	261	3,800	Ocean Freight Line, Inc., New York.

TOLEDO SHIP BUILDING CO., TOLEDO, O.

Toledo	Car ferry	Chief Wawatam	352	25 cars	Mackinac Transportation Co., St. Ignace, Mich.
Toledo	Tow boat	———	136	......	Charles Barnes Co., Cincinnati, O.
Toledo	Tow boat	———	136	......	Charles Barnes Co., Cincinnati, O.
Toledo	Tow boat	———	136	......	Charles Barnes Co., Cincinnati, O.

MANITOWOC SHIP BUILDING & DRY DOCK CO., MANITOWOC, WIS.

Manitowoc	Carfloat	————	190	8 cars	Chicago Junction Ry., Chicago, Ill.
Manitowoc	Dump scow	————	145	750 yds.	Great Lakes Dredge & Dock Co., Chicago, Ill.
Manitowoc	Riv. Lghtr.	Commerce	125	280	Merchants Lighterage Co., Chicago, Ill.
Manitowoc	Dump scow	————	145	750 yds.	Great Lakes Dredge & Dock Co., Chicago, Ill.

JOHNSTON BROS., FERRYSBURG, MICH.

Ferrysburg	Scow	Buffalo No. 46	156	1,000	Buffalo Dredging Co., Buffalo, N. Y.
Ferrysburg	Tug	Andrew H. Green	92	95	Great Lakes Dredge & Dock Co., Chicago, Ill.
Ferrysburg	Scow	G. L. D. & D. Co., No. 32	138	1,000 850	Great Lakes Dredge & Dock Co., Chicago, Ill.
Ferrysburg	Tug	Wm. J. McCarthy	92	95	Great Lakes Dredge & Dock Co., Chicago, Ill.
Ferrysburg	Tug	Oscar I	44	25	New Aetna Portland Cement Co., Fenton, Mich.

RACINE BOAT MANUFACTURING CO., MUSKEGON, MICH.

Muskegon	Light Vessel	Light Vessel No. 95	120		Bureau of Light Houses.
Muskegon	Light Vessel	Light Vessel No. 82	105		Bureau of Light Houses.

RIEBOLDT & WOLTER, STURGEON BAY, WIS.

Sturgeon Bay	Fish tug	A. W. Luebke	64.5		Luebke & Luebke, Two Rivers, Wis.

COLLINGWOOD SHIP BUILDING CO., LTD., COLLINGWOOD, ONT.

Collingwood	Pass. and Frt. Str.	Geronia	219.6		Ontario & Quebec Navigation Co., Ltd., Picton, Ont.
Collingwood	Pass. and Frt. Str.	Dalhousie City	201		Niagara, St. Catherines & Toronto Navigation Co., Ltd., St. Catherines, Ont.
Collingwood	Lght. Hse. Str.	Estevan	212		Canadian government.
Collingwood	Tug	John R. Stover	75		Blind River Towing Co., Ltd., Blind River, Ont.
Collingwood	Alligator Hull	No. 33	50		The Upper Ottawa Impr'vem'nt Co., Ltd., Ottawa, Ont.
Collingwood	Alligator Hull	No. 34	50		The Upper Ottawa Impr'vem'nt Co., Ltd., Ottawa, Ont.
Collingwood	Alligator Hull	No. 35	66		The Upper Ottawa Impr'vem'nt Co., Ltd., Ottawa, Ont.

POLSON IRON WORKS, LTD., TORONTO, ONT.

Toronto	Car float Pass.	————	224	18 cars	Canadian Pacific Railway.
Toronto	Sternwheeler	Bonnington	200		Canadian Pacific Railway.
Toronto	Sternwheeler	————	110		Corporation of Prince Albert.
Toronto	Pass. Str.	Buena Vista (Steel frame only)	96		Davis Dry Dock Co., Kingston, Ont.

Lighthouse Tender Camellia

The new $60,000 lighthouse tender Camellia, recently built for the bureau of lighthouses, department of commerce and labor, left Tompkinsville, New York, recently, for the station at New Orleans, La.

The contract for its construction was let by the bureau on Nov. 22, 1909, to the Racine Boat Manufacturing Co., of Muskegon, Mich. The tender was completed July 13, 1911, and upon delivery to the representatives of the lighthouse bureau, made the voyage from Milwaukee, Wis., where a partial outfit was placed on board, to Tompkinsville, N. Y., via the great lakes. The outfitting was completed at the latter port, and with a complement of four officers and 12 men, the boat left for New Orleans. It will be employed principally on the waters of Lake Borgne, Lake Ponchartrain, and Mississippi Sound.

The Camellia is 116 ft. long, 24 ft. beam and draws 6 ft. of water when loaded. The gross tonnage is 183.43, and net tonnage 124.74. Twin-screw triple-expansion engines of 400 H. P. are used.

Congress appropriated $60,000 for the construction of this vessel. The captain is Harold A. Mellgren. Thomas P. Fowler is the engineer; George W. Simmons, first officer, and W. L. Idstrom second assistant engineer. The crew consists of two quartermasters, four seamen, three firemen, one cook and two mess attendants.

Cunard Liner Laconia

The new Cunard liner Laconia went into commission on Dec. 9. The Cunard Steamship C . now owns nine ships built by Messrs. Swan, Hunter & Wigham Richardson, Ltd., of Wallsend-on-Tyne. Of course the best known of these is the famous Mauretania, and the other vessels are the Franconia, Laconia, Ivernia, Ascania, Ausonia, Carpathia, Ultonia and Albania. Next to the Mauretania, the Laconia and her sister ship, the Franconia, are the two largest ships that have ever been constructed on the river Tyne. The leading dimensions of the Laconia are 625 ft. in length, 72 ft. broad. Her gross tonnage is about 19,000 and her displacement 25,000 tons. The main engines have been built by the Wallsend Slipway & Engineering Co. They consist of two sets of four-crank quadruple-expansion engines, dynamically balanced on the Yarrow-Schlick & Tweedy system, steam being supplied by six large double ended boilers.

The Laconia will eventually run in the Liverpool-Boston service, though in the winter she will be employed in the Cunard cruises from New York to various Mediterranean ports. To add to the comfort of passengers by increasing the steadiness of the ship, Frahm's anti-rolling tanks have been installed. The Laconia is the first British ship and the first North Atlantic liner to be fitted with these tanks.

Growth of Isherwood System

That the Isherwood system of ship construction is growing is proved by the fact that during 1908 six vessels representing 19,747 gross tons were built on this system; during 1909 30, representing 110,055 tons; during 1910 40, representing 170,198 tons, and during 1911 64, representing 280,000 tons, a total of 140 vessels representing 580,000 tons. The largest vessel at present completed on the system is the lake bulk freighter William P. Palmer, 600 ft. by 58 ft. by 32 ft., built for the Pittsburgh Steamship Co. The total number of builders who have already built or are building on this system is 37, and the vessels have been built for 67 owners. Contracts placed during the year include two ocean-going colliers for the United States navy and five vessels for the American-Hawaiian Steamship Co.

A REMARKABLE RECORD

THE MARINE REVIEW in May last (p. 191) made reference to certain reports originating in Buffalo regarding the remarkable improvement effected in the performance of the steamer Tioga of the Union Steamboat line's fleet. Since then numerous reports have found circulation with respect to other ships of the fleet, but as to which definite information was not obtainable, Babcock & Penton, consulting engineers to the Erie Railroad Co., owner of the line, declining to make any statement. Through the courtesy of the management of the line, however, we are now able to give the results of the year's operation though details are withheld. The names of the ships are also suppressed for obvious reasons.

The fleet consists of eight steel ships all built for and operated in the package freight trade between Chicago and Buffalo. Calls are made at Fairport, O., and Milwaukee, generally in both directions, and at Cleveland westbound only.

For purposes of observation and comparison the fleet was divided into pairs of similar, or nearly similar ships. Thus A and B are identical, except that B is 20 ft. longer than A. C and D are identical as to power but vary slightly as to hull and boilers. E and F are identical as to hulls and boilers, but dissimilar as to engines, and G and H were identical as to engines but dissimilar as to hulls and boilers and also as to C and D.

Two ships, G and D, were selected for special attention; the others were merely given careful supervision and minor alterations and their performance followed closely. Increase in speed was not sought nor particularly desired except in the case of G; in fact the speeds of most of the ships, particuarly A, E and F, are too high and will be reduced. The engines of all the ships were worked at their shortest points of cut-off and the increase in speeds came about merely as a result of improved adjustment, better steaming, etc. The fuel used was identical for both years and, except in one instance, there was no change in the personnel of officers.

The position of the ships at the opening of navigation made it necessary to put both E and F into commission while the freight movement at first made the services of the entire fleet unnecessary, and A and B were not commissioned. F, however, being the most expensive as to fuel, was retired after two trips and A substituted. B was not commissioned until November, making only two trips, being put in to take the place of D because of greater capacity.

During the season of 1910 all ships were in commission; during 1911 six. The increase in number of trips per ship was 18 per cent and of cargo carried per trip 8 per cent. The increased efficiency, therefore, made the use of the entire fleet unnecessary at any time.

The following condensed performance sheet (Table I) represents the average of the entire season's work for each ship except B, of which the records for 1910 were so incomplete that no reliable comparison could be drawn. As a matter of fact the data as to F is not of much real value, being derived from only two trips in 1911 and yet exercises a material influence upon the fleet averages.

TABLE I.

	A		C		D		E		F		G		H	
	1910.	1911.	1910.	1911.	1910.	1911.	1910.	1911.	1910.	1911.	1910.	1911.	1910.	1911.
Hours running, per trip	159	156.5	176.6	172.8	179.3	167.9	166.1	156.3	161.6	150	215.1	164.4	161.6	163.8
Hours lay time, per trip	195.5	182.3	174.7	143.7	174.3	135.9	173.5	154.5	177.8	150	189.9	154.4	161.6	156.5
Hours on trip	354.5	338.8	351.4	316.5	353.6	303.8	339.6	310.8	339.4	300	405	318.8	323.2	320.3
Miles run	1818.8	1846.5	1850.5	1840.6	1853.8	1851.3	1807	1842	1913.2	1842	1930	1838.8	1838.7	1848.5
Miles per hour	11.4	11.8	10.4	10.66	10.3	11	10.9	11.8	11.9	12.3	9	11.2	11.3	11.3
Fuel, running, tons	220	204.9	176.6	156.5	185	127.7	190	167.6	208	189	262.5	151.2	190.6	180.8
Fuel in port, tons	27	21.6	25.6	34.75	21.8	25.7	68	62.5	65	64	22.5	15.2	27.7	17.8
Fuel per trip, tons	247	226.5	202.2	191	206.8	153.4	258	230	273.4	253	285	166.4	218.3	198.6
Fuel per mile, pounds	242	222	191	170	201	138	274	182	218.5	205	273	164	207	193
Increase in speed, per cent	...	3.5	...	2.5	...	6.7	...	8.3	...	3.7	...	24.4	...	...
Decrease in fuel, per cent	...	8.3	...	6	...	26.1	...	9.0	...	7.5	...	41.8	...	9.1

In this table "hours on trip" represents the total elapsed time between departures from Buffalo; "hours running" total elapsed time between harbor entrances, and, by division into the miles run, gives miles per hour. It will readily be observed that the mileage, which is that shown on charts and without any allowances for deviations from courses on account of weather, etc., divided by total hours between ports, without allowances for river work, fog, etc., results in an apparently low speed per hour, but as the same rule is applied in each case for both years, it is sufficiently accurate for the purpose. "Hours running", deducted from total elapsed time, gives "lay time".

Careful estimates by bunker measurement have been systematically made of the fuel used in port on every trip and this, deducted from the total coal charged to the ship gives the "fuel running" and "per mile".

The variation in mileage is due to the variation in trips; as for example, one ship may make several trips without calling at way ports while another may make all stops. The same condition consequently also affects the port coal.

TABLE II.

	1910.	1911.
Trips, total, all ships	105	93
Trips, average per ship	13.13	15.5
Trips, increase, per ship, per cent	...	18
Hours on trip, average	351	302
Hours, reduction, per cent	...	14
Speed, miles per hr, aver.	10.65	11.46
Speed, increase, per cent.	...	7.6
Fuel, total, all ships, tons	25,642	18,172
Fuel, per trip, av. tons	244	195
Fuel, per trip, reduction, per cent	...	20.1
Fuel, gross reduction, tons	...	7,470
Fuel, per mile, reduction, per cent	...	19.8

The collective or fleet comparison is given in Table II. The gross fuel reduction shown is due to several causes, of which the chief is, of course, the reduced number of ships in commission, but this could not have been brought about without the improved service rendered by the others, as shown by the fact that the average trips per ship in 1910 were 13.13, and in 1911, 15.5. The reduction in fuel per trip is directly responsible for about 4,500 tons with six ships in commission.

Taken altogether the showing is striking and worth, and will doubtless receive, serious consideration, especially the performance of D, a ship with modern triple-expansion engines and Scotch boilers of fair capacity, and which were in fair order; probably fully as good as the average ship in this respect.

As a result of the year's observation plans have been prepared for extensive alterations and improvements in the other ships of the fleet, all of which, with one exception, are equipped with triple-expansion engines and Scotch boilers of modern design, and the management confidently looks for further large gains in economy next season.

SHIP BUILDING AT SEATTLE

SEATTLE, Dec. 30.—So successful have been the steam whalers Moran and Paterson, launched last June by the Moran company, of this city, that the same firm has recently been awarded contracts for five more steam whalers of similar type. These vessels are either under construction or will be on the ways within a short time.

The plans for the Moran and Paterson were drawn from a model of a modern Norwegian-built whaler. Those constructed at the local yards were especially adapted for use on the Pacific, and those for which contracts have just been awarded will have a number of improvements not included in the types built in Norway, several of which are in use in British Columbia waters.

The Moran and Paterson, which have already been described in THE MARINE REVIEW, were built for the American-Pacific Whaling Co., the American corporation of the Canadian North Pacific Fisheries Co. The Moran and Paterson are in operation off the Washington coast, with headquarters at Aberdeen. For the British Columbia company the Moran company will build two more of the following dimensions: Length over all, 96 ft.; length between perpendiculars, 91 ft. 6 in.; breadth molded, 19 ft. 6 in.; depth molded, 11 ft. 2 in. They will have a number of improvements not included in the Moran and Paterson, but in general will be sister vessels. These new vessels will be oil burners, will be of steel construction, each will carry one Scotch marine boiler, a machine gun on the bow and the usual apparatus for pumping up the carcasses. They will cost about $65,000 each and will be delivered next March and April, respectively. These vessels, which have not yet been named, will have a large cruising radius, and being under British registry, they will operate in British Columbia waters.

To the Moran company, the United States Whaling Co. has just awarded contracts for three steel steam whalers along similar lines, and work has already commenced. This company has a capital stock of $3,000,000, subscribed by both United States and foreign capitalists, Balfour, Guthrie & Co. being agents for the concern. These vessels will be somewhat larger than the others, built by the same plant. Two of them will be 105 ft. over all, while the third will have a length of 117 ft. They will cost approximately $75,000 each. They will each have one Scotch marine boiler and otherwise will be equipped as are the Moran and Paterson with every modern device for harpooning whales and getting the carcasses to the rendering plant. They also will have a large cruising radius and their speed will be about 11 knots an hour, equal to that of the Moran and Paterson. They will be ready for delivery early in the spring. These three vessels will fly the United States flag.

The construction of these nine vessels within so short a time speaks for the rapid growth of whaling on this coast. This industry has been found to offer good returns and much capital has been invested. The success of the Moran and Paterson brought these other contracts to the local yards.

* * *

What is said will be the first molasses tank steamship in the world is now at the yards of the Moran company, in Seattle, where the steamer Hyades is undergoing extensive alterations to fit her for this trade. The Hyades, built at Sparrows Point, Md., in 1900, is a vessel of 2,932 net tons. She was built for the Boston Tow Boat Co., of Boston, and until four years ago was operated between Puget Sound, Japan, China and Manila. Two years ago she was sold to the Matson Navigation Co. and since then has operated in the Hawaiian trade. This company now has a contract to freight molasses from the Islands to a new chemical plant, recently established at Port Hadlock, Puget Sound, and for this purpose she is being converted. Three tanks are to be built, one on each side amidships and one in the center. Their capacity will be 145,690 gallons. There will also be installed molasses pumps, by which the cargo will be discharged after the manner of oil. This product will be used in the manufacture of cattle feed. While undergoing alterations, the Hyades will also be converted into an oil burner and fuel tanks with a capacity of 14,580 gallons will be installed. A new deck will be built, bulkheads strengthened and other work done, making the total cost about $50,000. The Hyades is to be ready early in December.

The Inland Navigation Co., which operates the largest fleet of passenger and freight vessels on Puget Sound, last week awarded to the Moran company a contract for a $250,000 steel steamer for use in local waters. Last year the Moran company built for the same owners the fast steel steamers Kulshan and Sioux, which have been operating in these waters with great success. The latest addition to this fleet will be christened the Solduck. This steamer is to have a speed of 16 knots. The length will be 205 ft., and beam 34.7 ft. She will be built with watertight bulkheads and a double bottom. Oil will be used as fuel and the latest in engines and boilers will be installed. Especial attention will be paid towards making this vessel strictly up to date in the matter of accommodations for passengers, for it is expected to use her to cater to a rapidly growing tourist travel to the Olympic mountains.

* * *

The Moran company has under construction or contracts for six submarines. Four of these, the Pickerel, Skate, Garfish and No. 35, are for the United States navy. The first two are to be completed next January, the Garfish is well along, and the keel for No. 35 has been laid. The same company will soon lay the keels for two vessels of the same type for the Chilean government.

New Ore Dock at Presque Isle

The new concrete and steel ore dock now under construction for the Lake Superior & Ishpeming Railway at Presque Isle, Lake Superior, will be ready for service well before the opening of navigation next year. While not the longest dock on the lakes, it is the most modern. The part containing the ore compartments is 1,200 ft. in length while the length of the dock to the shore is 1,463 ft. The dock is the highest on the lakes, being 75 ft. above water level and has 200 pockets, 100 on each side.

The Schuette Recording Compass Co., Manitowoc, Wis., has appointed the following agents. Heath & Co., Crayford, London; Wm. Rowekamp, Cappenbergsalle 4, Hamburg, Germany; Takata & Co., Tokio, Japan; John Bliss & Co., 128 Front St., New York, and George E. Butler, Alaska Commercial building, San Francisco.

TOWING VESSELS THROUGH PANAMA CANAL LOCKS

ACCORDING to the *Canal Record*, published by the Isthmian Canal Commission, specifications and plans for the locomotives which will tow ships through the locks have been sent to the Washington office, in order that bids may be asked for the 40 locomotives that will be required for the locks at Gatun, Pedro Miguel and Miraflores. The system of towing outlined in the specifications is the invention of Edward Schildhauer, of the canal engineering staff, and patent has been applied for, the government having the right to use the patent without remuneration. Two bids will be called for, one for one locomotive for test purposes, and the other for the remaining 39, in case the first is satisfactory.

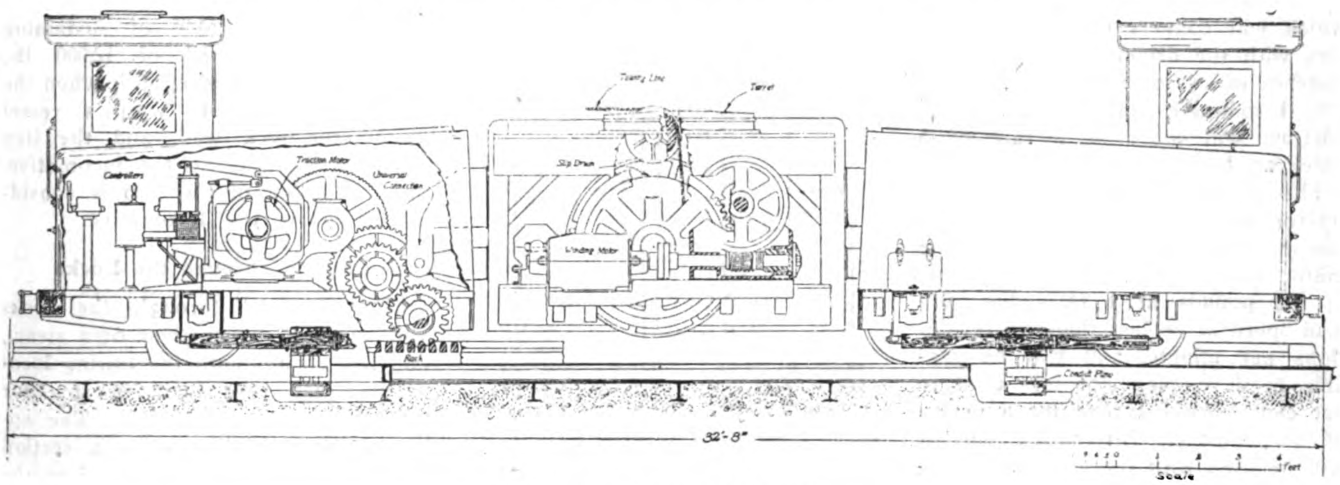
The system of towing provides for the passing through the locks of a ship at the rate of two miles an hour, the vessel being held steady between four lines of taut hawsers. A ship will come to a full stop in the forebay of the locks, where four hawsers will be attached to it, two forward on either side and two aft. At their other ends, these hawsers will be attached to the windlasses of four towing locomotives operating on the lock walls, two forward towing, and two aft being towed by their hawsers, thus holding the ship steady. The locomotives will run on a level, excepting where they pass from one lock to another, where they will climb heavy grades. Between the lower and intermediate locks at Gatun, for example, there is a difference in elevation of 29 ft. 7 in., and, in order to save concrete, this ascent is made in the shortest feasible distance. The horizontal distance from the point of tangency on the lower lock wall to the point of contact on the wall of the intermediate lock is 106½ ft. The vertical curve has a radius of 100 ft., and the maximum grade is one on two.

There will be two systems of tracks, one for towing and the other for the return of the locomotives when not towing. The only cross-overs between the tracks will be at each end of the locks, and there will be no switches in the rack road. The tracks will be of the 5-ft., Panama railroad gage, laid with 90-pound Bessemer steel rails on Carnegie steel ties, each tie anchored into the concrete by a bolt on the side farthest from the lock chamber. On the center wall there will be two towing tracks and one return track between them, and on each side wall a towing and return track. The towing tracks will have a center rack throughout, and the locomotive, while towing, will always operate on this rack. On the return tracks, at the incline between locks, they will also operate on racks, but elsewhere they will run by friction. The racks will be of cast steel, so formed that lubricant will not drop upon the concrete, and that water will not be held in the interstices, this latter precaution being taken against the breeding of mosquitoes. The distance from center to center of adjoining teeth is 3.13 in. After hauling the ship through the last gates, and into the forebay, the locomotives will coil their cables and return to await another ship, or will take hold of a vessel going in the opposite direction and tow it through.

Each locomotive will consist of three parts, as shown by the drawings reproduced on this page—two tractors, and between them, a windlass. The windlass will not be mounted upon a truck, but will be supported by two arms extending on each side from either end and resting on bearings immediately over the rear wheels of the tractors. The ends of these arms will be equipped with rollers to permit free horizontal movement of the members when the locomotive is rounding a horizontal curve. The windlass is joined to the tractors by a drawbar and trunnion which have the effect of a universal joint, and permit free movement of the parts when the locomotive is on a vertical curve.

The tractors will be alike in every particular, each consisting of a four-wheel truck upon which are mounted a motor and a control apparatus. They will run as rack or friction locomotives at the will of the operator, and on the whole the locomotive can be controlled from either cab.

While towing, and on the inclines between the locks, the tractor will



ELECTRIC TOWING MACHINE

Side view. One tractor, showing housing, one tractor and the windlass unit without housing showing the machinery with certain parts omitted to depict the more clearly the working features

run as a rack locomotive. Motion is communicated from the motor to the rack pinions by means of a system of gear reduction in which there are no clutches. There is absolutely no means of disconnecting this train of gears, and, as a result, the rack pinions are in motion only when the motors are. A solenoid brake, which closes upon a brake wheel whenever the current is cut off from the motors, provides against accident in case the current should be cut off while the locomotive is on one of the inclines. In such an event, the locomotive would come to a stop instantly, and be held there until the brake should be released. The rack pinions are of quill construction, and are so mounted upon the back axle of each truck, that the rack pinion will run free from the motor when the locomotive is on the return track, and traveling by friction.

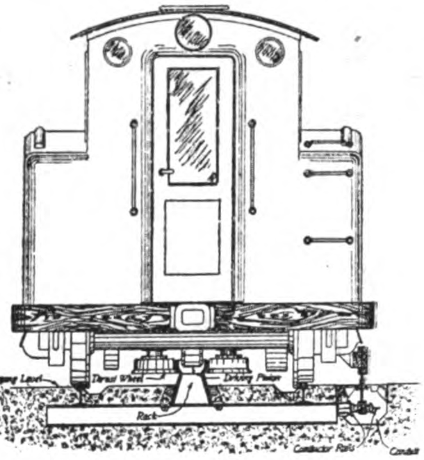
For traveling by friction, the tractors will be fitted with jaw clutches, which will connect the traction motors with the driving wheels. These clutches will be operated by solenoids. The locomotive, when operating by friction, will move at a rate of 5 miles an hour.

The electrical equipment for each tractor will consist of one traction motor with control apparatus. The motor will have a full speed torque of 840 pounds at 1 ft. radius, full load speed at no less than 470 revolutions per minute, and will be capable of developing not less than 75 per cent greater torque for a period of one minute. Alternating current will be used with the effect that synchronous speed will be maintained on all the locomotives in a tow. The motor will be three-phase, induction, totally enclosed, moisture-proof, high torque, or mill type, 25 cycles per second, with 220 volts between lines. The motors on the tractors of each locomotive will be operated in parallel, and controlled by resistance in the secondary circuit, accomplished by contactors in the primary and secondary circuits operated by master controllers, one in each cab. There will be not less than seven power points in each direction and between these and the braking position there will be a coasting point so that when power is turned off from either forward or reverse directions, there will be available a coasting point before the braking position is reached. The master controllers will be of the drum type, one for each tractor.

Current will be collected by each tractor by means of a plow carrying two contact shoes, each operating on a separate power rail carried in an open circuit, one for each of two phases, while the third phase will be carried by both track rails. The maximum load that will be thrown upon the traction motors will occur when the locomotive is ascending the inclines between the locks, and this will be greater than the load of towing a ship. Inasmuch as weight is not required for tractive effort, the whole locomotive will be of light construction as possible, the estimated weight being 70,000 pounds.

Windlass.

The third part of the locomotive will be a windlass for hauling in or paying out the tow line, and motors to drive it. The drum will be 18 in. in diameter. A friction clutch will provide against it ever sustaining a pull of more than 25,000 pounds. Two speeds are provided for, one for coiling in the line under load at a rate of 10 feet a minute, and the other for coiling it when not under load, at a rate of 200 ft. per minute.



ELECTRIC TOWING LOCOMOTIVE
End view, showing rail system with rack rail in center and power rail on side in open conduit

Rotary switches in the cabs of each tractor will control the movement of the windlass.

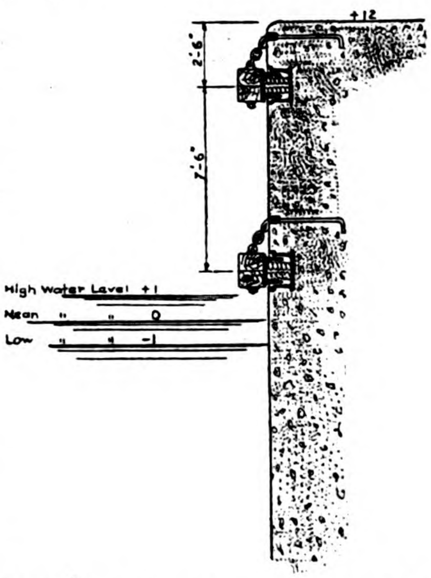
There will be two motors, one for operating the windlass under load, and one for the rapid coiling of the hawser. The windlass motor will have a full speed torque of 120 lb. at 1 ft. radius, will be capable of 50 per cent greater torque for one minute, and will have a full load speed of not less than 630 revolutions per minute. The coiling motor will have 30 lb. torque at 1 ft. radius, be capable of exerting 50 per cent greater torque for one minute, and will have a full load speed of 630 revolutions per minute. These motors will be of the squirrel cage type, but otherwise will have the same classification as the motors in the tractors.

The towing line will pass through a sheave in a revolving turret, which will permit it to rotate easily in a horizontal plane, so that the line load may always be directly on the guiding sheave. The tow line will be of plow steel wire, composed of six strands of 37 wires each, will have a hemp center, and will be 1 in. in diameter. The wires must have a tensile strength of not less than 225,000 lb. per square inch, and the hawser must have an ultimate breaking strength of not less than 70,000 lb. There will be a 4-ft. loop at the ship end, and the length of the line from the center of this loop to the drum of the windlass will be 215 ft.

All the machinery, for both windlass and tractors, will be housed in a steel casing. The housing of the windlass will consist of a steel frame covered with 3-16-in. steel plate. The top sheeting must be capable of standing a strain of 85 lb. per square foot, and the upper side edges of the housing must be capable of sustaining a concentrated load of 12,000 lb., which may be placed upon it when the tow line is used to warp a vessel up to the lock wall, and the line is at right angles to the locomotive, and the chock of the ship is considerably below the locomotive.

Passing Through the Locks

Ships passing through the locks will approach under their own steam, and will anchor until the towing locomotives can take them in tow for passage through the locks. The approach is formed between a section of the center wall, extending into the canal from 1,445 to 1,700 feet from the first gate, and flare or wing walls,

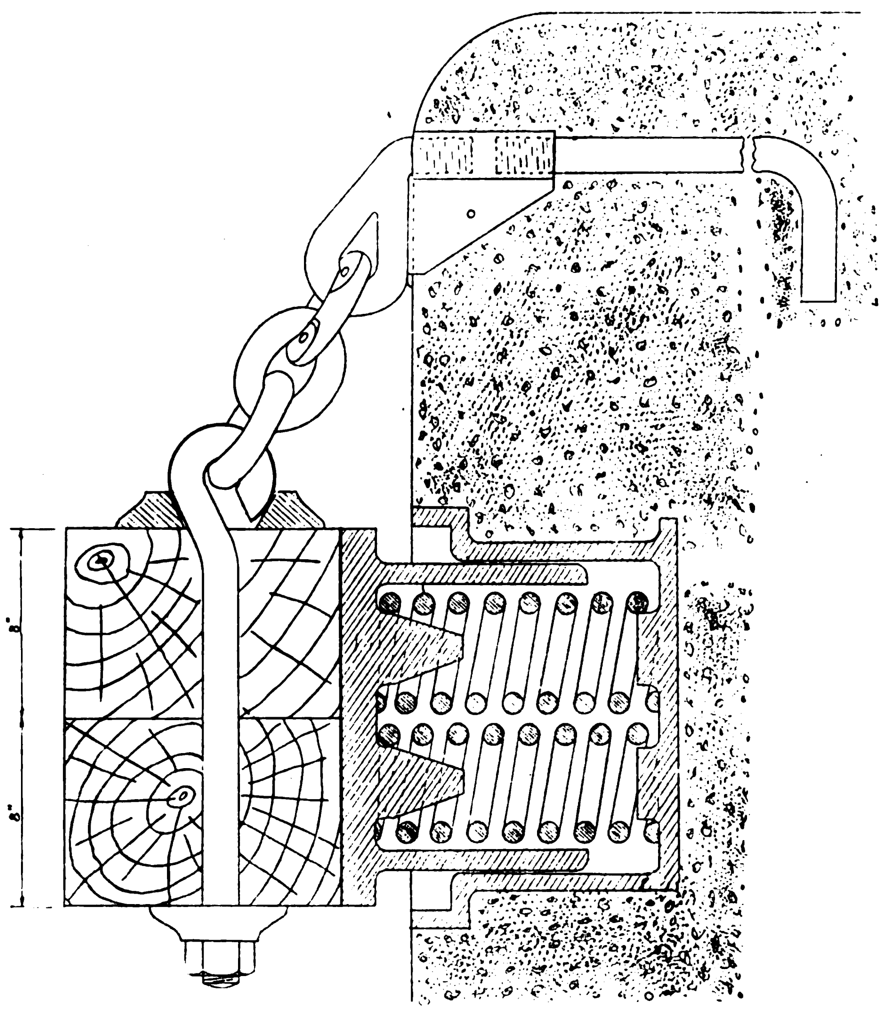


SECTION OF LOCK WALL SHOWING PARALLEL LINES OF BUFFERS

which are a continuation of the side walls. These walls will be fitted with wooden fenders composed of 12 by 16 in. stringers running longitudinally along the sides, bearing every 5 ft. against a casting supported by a nest of four springs. The sketches printed herewith show the location of the fenders on the walls, and the method of suspending them so that they will bear upon the springs. The purpose of the fenders is to take the stress caused by a ship bumping against the walls.

The cups in which the springs are nested are anchored into the concrete of the walls by means of a flange on the top and bottom. These castings are 17¾ in. long, 14¾ in. wide, and 11½ in. deep, and weigh 216 lbs. each. The movable buffer casting, which acts as a cap for the springs, is 16 in. long, 12⅝ in. wide and 10⅝ in. deep. The springs are to be made of carbon or chrome vanadium spring steel, will be 12¼ in. long when free, 9¼ in. when loaded, 3 1-16 in. inside, and 4 in. outside diameter, and must be capable of being compressed not less than 3 nor more than 3½ in. under a load of 7,500 lbs.

The stringers will hang by three links from eyes on the ends of steel anchor bolts, 1½ in. in diameter, embedded in the concrete 2 ft. 5½ in. Thus, free movement will be procured. The nests of springs will be spaced along the walls at 5-ft. intervals, and the hangers for the wooden fenders will be at intervals of 15 ft. Each hanger bolt will splice two stringers so that each row of fenders will be a continuous line of stringers. The shortest of these will be on the upper approach wall at Gatun, 970 ft., and the longest on the lower approach wall at Gatun, 1,202 ft. There will be in all the locks 48 rows of buffers—double rows on each side of six middle approach walls, and on 10 of the side or wing walls, and one row on the side wing walls at the upper end of Miraflores and Pedro Miguel locks.



SECTION THROUGH NEST OF SPRINGS SHOWING CUPS IN WHICH SPRINGS ARE HELD AND ALSO METHOD OF HANGING BUFFERS UPON THE WALL

Boiler Manufacturers' Association

The twenty-fourth annual convention of the American Boiler Manufacturers' Association, together with its associate members, and the Supplymen's Association, will be held in New Orleans, La., March 12, 13, 14 and 15, 1912, at which time some very important papers will be presented to the association, and other important business of interest to all the boiler manufacturers in the United States and Canada, and supply houses dealing with the boiler and tank industry. An extensive program of entertainment has been arranged, and a large attendance of boiler manufacturers and supplymen from the United States and Canada are expected to be in attendance.

American Ship Windlass Co.

The American Ship Windlass Co., builder of the Taylor stoker and marine equipment such as steering gears, ship windlasses, towing machines, winches, anchors, etc., have been located for over half a century in Providence, R. I., at Waterman and East River streets. This plant has now been abandoned and all the business of the American Ship Windlass Co. has been transferred to Philadelphia, where the company already had a large plant. To accommodate the growing business a large foundry has recently been erected in Philadelphia. This company was established 54 years ago by Frank S. and Joseph Manton, who had much to do with the invention of the ship windlass. From the manufacture of the ship windlass the company branched out and since have added their marine machinery, and in 1905 began the manufacture of the automatic stoker, invented by E. E. Taylor, of Boston. This stoker, which is of the underfeed type and an inclined fuel bed, is being extensively introduced into power plants requiring a large capacity in a small space, and in cases where it is necessary to burn soft coal without smoke.

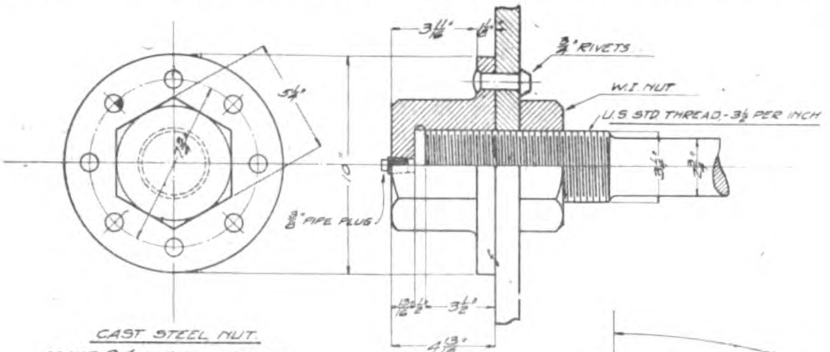
Fred M. Harmon, fleet engineer of the Wilson Transit Co., has organized the Harmon Feed Water Purifier Co., with offices in Cleveland and Duluth. This purifier is designed for marine, stationary and locomotive boilers, and will be manufactured in Cleveland. The officers of the company are: Fred M. Harmon, president; John Sinclair, vice president; J. H. Opperman, of Duluth, secretary and treasurer.

Advanced Boiler Construction

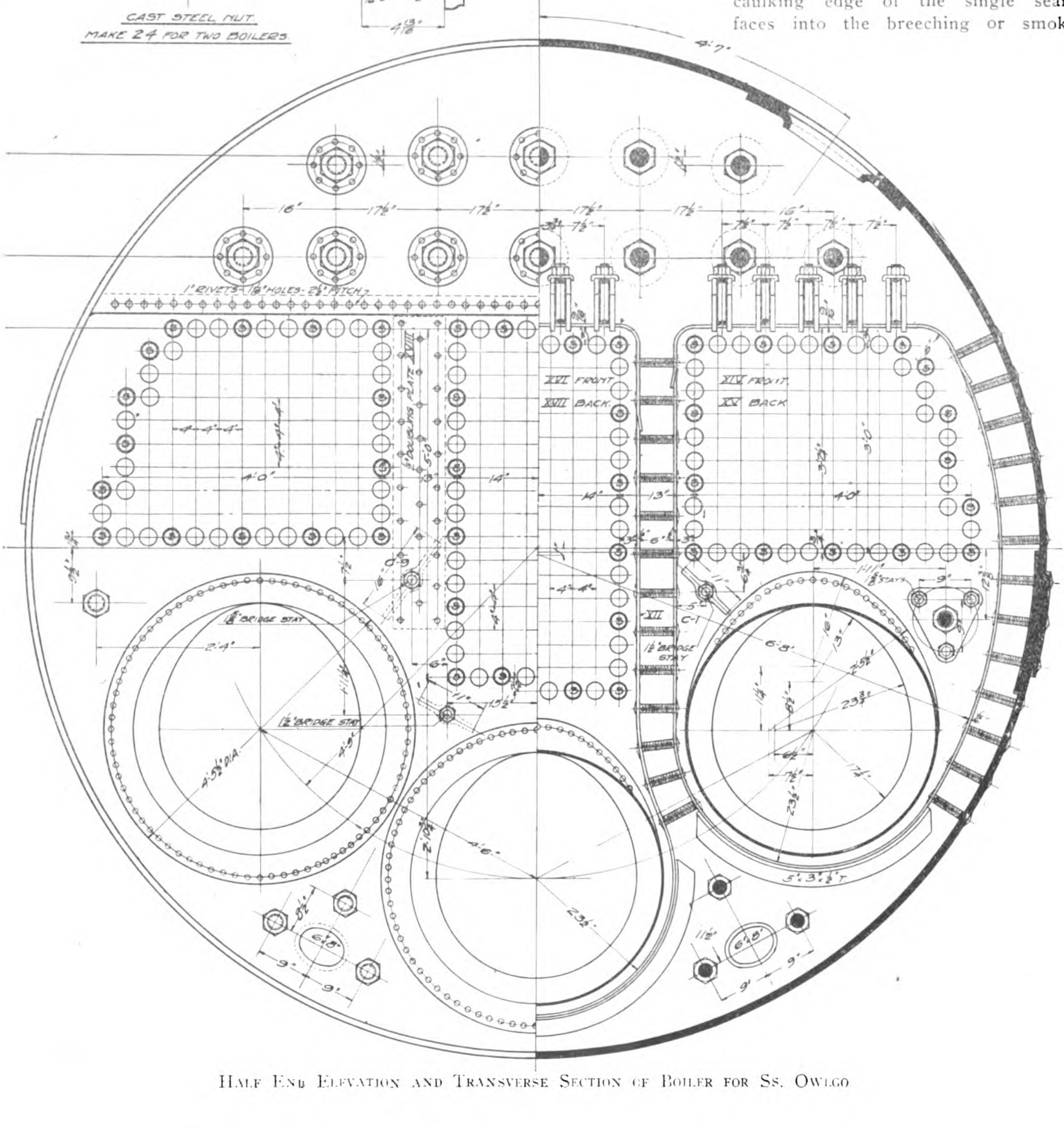
THE MARINE REVIEW for May, 1909, reproduced drawings of a large boiler built on the Pacific coast and the shell of which was constructed of only two plates, these plates being 25 ft. 1½ in. long and 11 ft. wide. Herewith we are able, through the courtesy of The American Ship Building Co., to present illustrations of two large boilers which the company now has under construction for the steamer Owega, of the Erie Railroad fleet, and the shells of which are also built with only two plates. These are the largest boilers so far built on the lakes in which this type of construction has been followed, and in fact practically represent the limit of existing rolling mill capacity, being 23 ft. long and 11 ft. 8 in. in width. The plates were rolled by Worth Bros. Co., Coatesville, Pa.

These boilers may be fairly said to embody the most advanced ideas in the construction of modern marine steam generators and several features of interest will be noted, though probably none can be said to be original.

The two-piece front head eliminates seams behind the breechings and air-casings, the boilers being designed for positive mechanical draft, and the caulking edge of the single seam faces into the breeching or smoke



CAST STEEL NUT.
MAKE 24 FOR TWO BOILERS

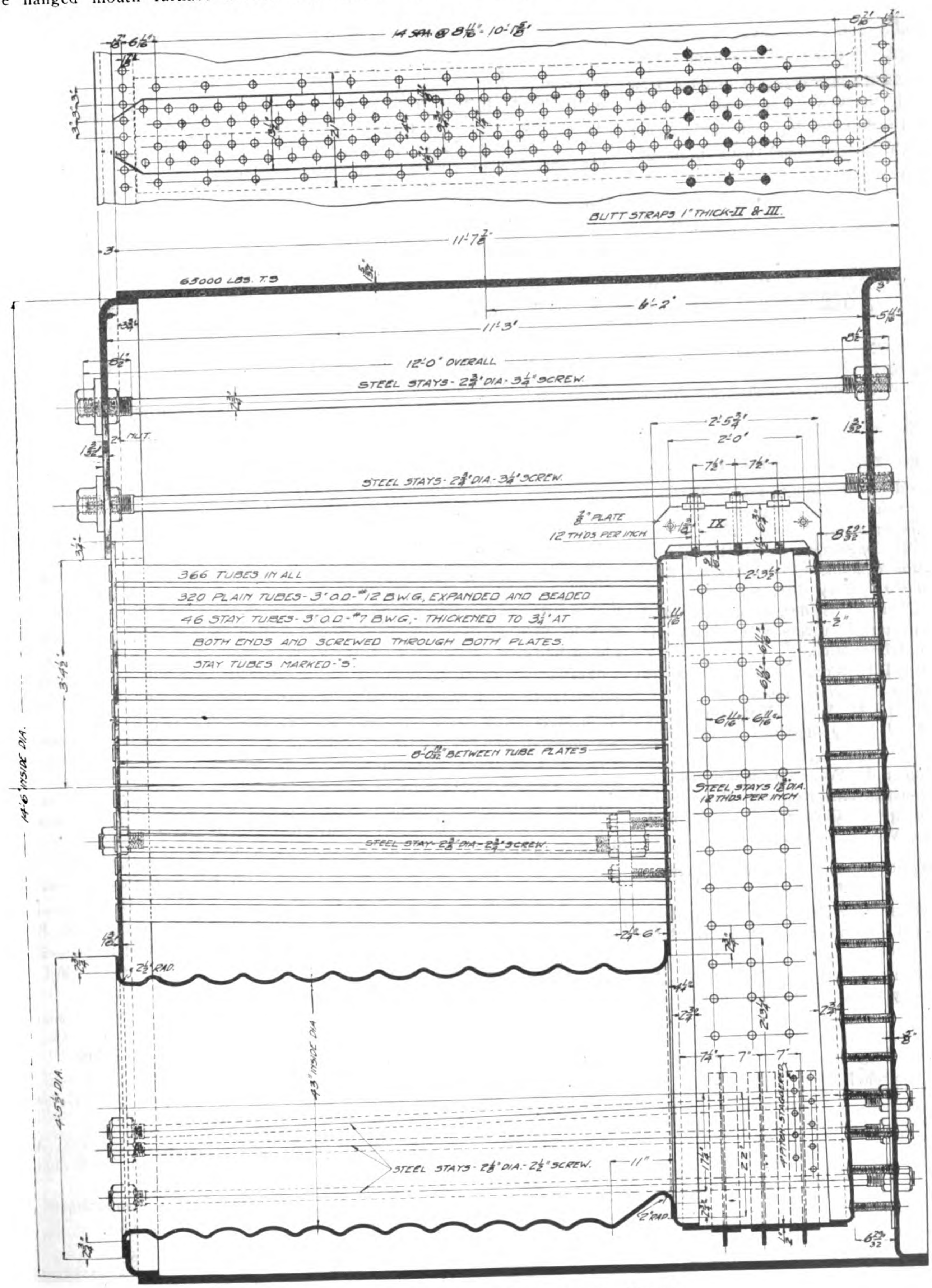


HALF END ELEVATION AND TRANSVERSE SECTION OF BOILER FOR SS. OWEGO

casing where its entire length is accessible.

The flanged mouth furnace avoids the difficulty of making fits between the furnace and head and which is unavoidable with the flanged head sheet, and furthermore makes for a longer and more roomy stokehold.

The distance between the nests of



LONGITUDINAL SECTION OF BOILER FOR SS. OWEGO

tubes and between the tubes and the shell permits of access to every part of the interior without difficulty; and manholes, other than the statutory opening above the tubes, are not required. Openings of any kind behind air casings or where not in plain view at all times are eliminated although hand and cleaning out holes (not shown in drawings) have been liberally supplied.

An interesting feature will be noted in the front head nuts of the through-stays. These are made in cap form and combined with the reinforcing washer so that leaks at these points, which, as every engineer will appreciate, are not uncommon, and being behind the air heaters and uptakes, are practically inaccessible, are entirely avoided. The small screwed plug in the head of the nut is merely to enable the inspectors to locate the end of the stay during construction. The nuts are of course permanently riveted and caulked to the head as shown.

There will be no made-up joints of any kind on the shell or heads (except the man and hand holes), all attachments being made to permanently riveted and caulked nozzles which bring the joints outside the lagging.

Interest will, however, center chiefly about the elimination of the girth seam and scarfed butt-straps which as is well known make permanently tight work difficult.

The boilers are being built to the designs of Babcock & Penton, Cleveland and New York, and for a working pressure of 170 lb.

Naval Architects and Marine Engineers

At the annual meeting of the Society of Naval Architects and Marine Engineers, held in New York, Nov. 16 and 17, the society elected the following members of the council:

For Term Expiring Dec. 31, 1914.

Cecil H. Peabody, professor naval architecture, Massachusetts Institute of Technology, Boston, Mass.

F. L. DuBosque, assistant engineer, floating equipment, Pennsylvania Railroad Co., Jersey City, N. J.

Herbert C. Sadler, professor naval architecture, University of Michigan, Ann Arbor, Mich.

Daniel H. Cox, naval architect, 15 William St., New York.

Richard M. Watt, chief constructor U. S. N., navy department, Washington, D. C.

Homer L. Ferguson, superintendent of construction, Newport News Ship Building & Drydock Co., Newport News, Va.

Associate Members of Council, for Term Expiring Dec. 31, 1914.

Herbert L. Aldrich, publisher International Marine Engineering, 17 Battery place, N. Y.

Commander A. P. Niblock, U. S. N., navy department, Washington, D. C.

The council elected as members of council, vice C. B. Orcut, deceased, for term ending Dec. 31, 1912:

Harvey D. Goulder, proctor in admiralty, Rockefeller building, Cleveland.

MEMBERS.

Gardner Cornett, vice president American Steam Gauge & Valve Mfg. Co., 30 Church St., New York.

Stephen A. Gardner Jr., engineer, Electric Boat Co., Groton, Mass.

Joseph E. Henderson, ship and engine builder, Ft. Montgomery St., Baltimore, Md.

Arthur P. Homer, naval architect and engineer, 88 Broad St., Boston, Mass.

James Kennedy, superintendent marine department, J. M. Guffey Petroleum Co., 21 State St., New York.

Lewis B. Doane, chief engine draftsman, Electric Boat Co., Groton, Conn.

George H. Kochersperger, assistant to general superintendent, Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia.

Charles S. Linch, consulting engineer and naval architect, Bordentown, N. J.

Richard A. McCabe, assistant superintendent engineer, U. S. A. transport service, pier 12, San Francisco, Cal.

George A. Orrok, mechanical engineer, New York Edison Co., 55 Duane St., New York.

Ernest O. Patterson, inspector in ship construction, U. S. engineer department, Dubuque Boat & Boiler Works, Dubuque, Ia.

Linden Stuart, ship and engineer surveyor, American Bitumastic Enamels Co., 109 Broad St., New York.

William Newman, works manager, Polson Iron Works, 125½ Sherburne St., Toronto, Can.

Herbert B. Saunders, marine surveyor, 15 Whitehall St., New York.

Theron S. Atwater.

E. A. Burnside, manager, Campbell's Creek Coal Co., Point Pleasant, W. Va.

A. A. Kennedy, port engineer, Mallory Steamship Co., 457 Seventy-fifth St., Brooklyn, N. Y.

A. S. Hebble, superintending engineer, pier 49, N. R., New York.

W. F. Lee, chief engineer, C. W. Hunt Co., West New Brighton, N. Y.

W. A. White, president and treasurer, Washington Engine Works, 601 Washington St.

ASSOCIATES.

Adolphe E. Barie, vice president Taylor Iron & Steel Co., High Bridge, N. J.

Robert A. C. Smith, president American Mail Steamship Co., 100 Broadway, New York.

Hans R. Morch, draftsman, Fore River S. B. Co., Quincy, Mass.

Charles A. Schafer, computer, scientific department Electric Boat Co., Quincy, Mass.

William Shaw, chief engineer, S. Y. "Vanadis", 103 Bellevue avenue, Upper Montclair, N. J.

Robert S. Haydock, engineer, Mosher Water Tube Boiler Co., 30 Church St., New York.

John W. Anderson, leading draftsman, Electric Boat Co., Groton, Conn.

A. W. Frank, assistant naval constructor, U. S. N., navy yard, Boston.

P. G. Lanman, assistant naval constructor, U. S. N., navy yard, Boston.

H. O. Nickerson, general manager, New England Navigation Co., pier 19, North river, New York.

G. A. White, assistant general manager, Hudson River Line, Desbrosses St. pier, New York.

E. M. Bull, vice president, A. H. Bull Steamship Co., 10 Bridge St., New York.

A. A. Cameron, 940 Fourth Ave., East, Owen Sound, Ont.

JUNIORS.

Gordon G. Holbrook, assistant in naval architecture department, Massa-

chusetts Institute of Technology, Boston, Mass.

Robert L. Hogan, draftsman, Fore River S. B. Co., Quincy, Mass.

Ralph T. Hanson, assistant naval constructor, U. S. N., navy yard, Boston, Mass.

Jerome C. Hunsaker, assistant naval constructor, U. S. N., navy yard, Boston, Mass.

F. Carlsen, student, Webb's Academy, New York.

G. A. Colley, student, Webb's Academy, New York.

G. A. Newton, draftsman, Whittelsey & Whittelsey, 11 Broadway, New York.

JUNIORS TO MEMBERS.

Carl A. Bergstrom, leading draftsman, Fore River S. B. Co., Quincy, Mass.

Frederick A. Hunnewell, draftsman in charge, superintending constructor, New York Ship Building Co., Camden, N. J.

Ambrose M. Merrill, draftsman, Hull division, navy yard, New York.

A. Loring Swasey, president Swasey, Raymond & Page, Inc., Colonial building, Boston, Mass.

A. V. Curtis, draftsman, navy yard, Washington, D. C.

L. M. Thompson, draftsman, bureau of lighthouses, Washington, D. C.

D. Bailey, draftsman, navy yard, New York.

Howard C. Towle, leading draftsman, New York Ship Building Co., Camden, N. J.

Nathaniel A. White, draftsman in charge, estimating department, Hull division, navy yard, Philadelphia.

Ernest Fils, chief draftsman, Robins Dry Dock & Repair Co., Erie Basin, Brooklyn, N. Y.

Eads Johnson, consulting engineer, 30 Church St., New York.

JUNIOR TO ASSOCIATE.

Frank H. Crane, president and manager, Townsend & Moore Engineering Works, Erie Basin, Brooklyn, N. Y.

Robert C. Simpson, draftsman, New London Ship & Engine Co., Groton, Conn.

Constantine D. Callahan, naval architect and engineer, 1811 Center St., San Pedro, Cal.

William J. J. Young, draftsman, superintending constructor's office, Fore River Ship Building Co., Quincy, Mass.

Model Basin Investigations

Naval Constructor David W. Taylor's paper entitled "Some Model Basin Investigations of the Influence of Form of Ships Upon Their Resistance," was read by title only, as Mr. Taylor has been called to England to testify as an expert in the Olympic-Hawke collision case, Mr. Taylor having made a number of experiments in the tank at Washington to determine the influence of suction.

Mr. Lewis Nixon then read his paper on "The Panama Canal and American Commerce," printed elsewhere in this issue.

Discussion on Mr. Nixon's Paper.

The President: Mr. Cox, the secretary, has received a typewritten discussion from Mr. Chamberlain, commissioner of navigation. It is an old document, and perhaps most of you are familiar with it.

Lewis Nixon: The only point in regard to that is that Mr. Chamberlain attacks the few ideas that I have advanced, the attack being made on the very lines on which they are usually attacked. He is a man who, in his last report, said there was great opposition to giving the American register to foreign ships, but it would do no harm, because we had no ships in the foreign trade; in other words, that so long as we had through indifference and neglect and short-sighted statesmanship killed ship owning, that he burned the widow, ship building, on the funeral pyre with it, and he has gone to great length to establish the fact that there are treaties in the way of preferring our own ships and saying to the world that through the Panama canal our ships will go free just as they would through any other highway of the United States. He makes the contention there, as I discovered by reading his article somewhat hurriedly, that we can treat all nations with equality, and that is twisted to the extent that we must treat all other nations as ourselves.

My interpretation of that, and a fair mercantile interpretation, is that we should treat any other nation using that canal with any particular favor, compared with other competing nations, or other nations having canals of their own, and as has been stated, it is a very lengthy document, but I consider it is of extreme importance, and of course, I shall answer it in due course of time. It will be used, however, no doubt as an answer to the few expressions of my own contained in my paper, and probably to the disadvantage of those particular ideas, before my own paper gets into circulation. But I am rather used to that, if those here do not want it read.

Walter M. McFarland: I had the pleasure of reading Mr. Nixon's paper as a member of the publication committee, and was very much pleased with it, indeed. As I said here last year, I think it was, or possibly the year before, he has made such a careful study of this whole subject of advancing the interests of the merchant marine that I feel anything he says on the subject is worthy of the most careful consideration.

Tremendously Live Subject

Generally speaking, I should say that I am in agreement with him as to the method that he follows. It might be that some question of detail would come up on which we would not agree, but in general I think it is right, and I believe that this is a tremendously live subject for our society. I have said that before and I say it again. There is no organization in the country that has the same vital interest in an increased merchant marine that we have, and I feel that everything we can do to push it along ought to be done, and I feel that the interest Mr. Nixon shows by giving us his paper is something worthy of a great deal of praise.

Discussion by John Reid

John Reid: I think, gentlemen, that every story has two sides to it, and I don't want you to imagine for a moment that I am going to say anything that will run counter to any ideas or theories Mr. Nixon has about the improvement of the merchant marine of the United States. The United States must have a merchant marine and have it jolly quick, if it is to take the position in the world that its size and influence entitled it to, and everything that would help that will be for the advantage of the United States and the world in general, but when you come to talk about abrogating treaties and giving free passage to United States vessels through the canal and abrogating treaties which give some rights to European nations, I am not specifying any particular one—we will say Germany or any other foreign nation—you run up against this, that the other fellow has something to say about that, and he does not usually do it by coming to you diplomatically and saying "We have a treaty with you that you were to leave the canal open," but he says, "I have a lot of ships, and want to use that canal, and I have a lot of goods to buy from you, and will say grain from the west and canned goods and peaches," and everybody knows what a tremendous trade that is, but the world is getting smaller every day, and if you put obstacles in the way of people buying the goods where they

get them to the best advantage, they go somewhere else, and that is quite a serious matter for this country. You want to increase your export trade, and have your own ships to enable you to do that, but if you put a high rate on your freight, and put obstacles in the way of other people carrying goods in their own bottoms, they simply get these same articles from another place.

Sensitiveness of Trade

I know a little about this thing, because I have noticed—take the British market by way of reference, the British market has been buying grain in enormous quantities throughout the northwest. Until a few years ago the basis of all their flour came from the northwestern part of the United States and Canada. That trade petered out a year or two ago and there was no grain going down the St. Lawrence, and the reason was the Canadians put obstacles in the way of the grain going out. They increased the price of it. There were good crops elsewhere, and the British simply bought them in the Argentine, Austria, or wherever there was a surplus. Grain is going to be such a delicate thing that it does not require any diplomatic channels to bear on the export trade. The buyer has a lot to say how he shall have the stuff shipped. That is your difficulty Incidentally, see how much it will be to the shipping trade of the United States to have that capacity, because you are going to do your own trade—that you have already determined to do—therefore you can do what you will with the fees from vessels passing through the canal, but it will require more than the rebate of the dues from the canal to promote that foreign shipping which you are so anxious to have.

I do not think one should forget either that this idea of giving special privileges or having special treaties is more or less an exploded idea today. It is one in which a great deal of splendid work has been done in developing new interests in this and other countries, but the people today are more concerned about the nation pulling as a whole and getting their goods shipped in the cheapest possible way.

While the United States is to have its own merchant marine, with the world closing all around it, so to speak, I see that the tremendous asset in the development of the United States is that it has been able to draw on Norway, Germany and Britain, and every other country, for a cheap form of trade. The export trade of the United States is as much based on that today as on any other factor. The margin or whatever the price at which you get an order in China depends on the rate of freight, and you cannot increase the rate of freight without losing that business, especially as you pay much higher wages for your labor, and I do not see how you will get any particular advantage by getting a rebate of these canal dues. This is a personal opinion, and I have only put it out as the other side of the story.

The President: Is there any further discussion of the paper? If not, we will ask Mr. Nixon to close the discussion.

Mr. Nixon's Reply.

Lewis Nixon: In the first place, the last speaker said he did not believe in encouraging enterprise. I want to say that the great enterprise on the ocean is encouraged to the extent of $42,000,000 by our foreign competitors. He say he thinks we might as well give up, since our wages are so high. We will never do anything unless we start somewhere. Here is a chance—we have a canal, backed by our own people with our own money, and which is constructed through our own territory. There was a veiled insinuation that possibly two can play at the same game. If we go through the Suez canal we pay. Other nations have been able to get by foresight shares in the Suez canal which return to them in profits what they pay for rebates in ships. We are to spend $400,000,000 on the canal, and we say we will collect tolls, not to make it a profitable enterprise, but as an altruistic enterprise, which must pay its own way. Since the greater parts of the ships of the world are under a foreign flag, they will pay the tolls, and if we are to start to develop our merchant marine, we must start somewhere. It is a great problem. Other nations are not going to give it to us easily. There is no brotherly love in connection with the matter. We must go for it and fight for it. Unless we take drastic measures to carry freight in our own bottoms, we will not be able to do it.

To say that we cannot abrogate treaties is to say that treaties are so binding in their general characteristics that a nation must always abide by them. In olden times most of our industrial conventions were separated from the idea of a treaty of peace. In a treaty of peace you do not say that you will be at peace for a certain number of years, but forever, unless some cause brings about a war. But in a commercial convention, by which certain nations secure certain advantages, every one of these conventions have a limit of time during which they are operative. When you take into account the commercial character of a convention, it is terminable. Here is a case wherein we are bound to prefer our own ships, in our own water, in a great enterprise paid for by our own people, and in a territory over which our own flag floats.

If we are to make a declaration of independence in favor of American shipping on the ocean, we must begin some time, because every day is lessening the opportunities for doing this, and delay will only ultimately prevent our ever rising to the occasion. In other words, hopeless dependence on foreign trade progressively increases, and while the plan suggested may not do it all, it will be a very good lift, and it is about time to start.

The Resistance of Some Merchant Ship Types in Shallow Water

THE next paper read was Prof. Herbert C. Sadler's, entitled "The Resistance of Some Merchant Types in Shallow Waters". This paper embodied the result of a number of experiments which Prof. Sadler has made in the tank at the University of Michigan with models of various types of merchant vessels. These models represent actual vessels ranging from fine to full types, some of the broader types being of from five to six beams to the length. They were loaded in each case to their respective load draughts and hence the depth-length or depth-draught ratio varies in most cases. It is interesting to note that the various humps in the resistance curves occurred at practically the same speed, irrespective of the length of the model, which indicates that the speed at which the maximum resistance occurs is a function of depth of water rather than of size of ship.

Discussion on Prof. Sadler's Paper.

Prof. C. H. Peabody: I agree with the chairman that a discussion is very important when we can have one, and that this paper is well worthy of a discussion, but at the same time I am almost inclined to believe that discussion is impossible. Here a very important piece of work has been done and the results are given to us. We have no hesitancy in accepting the results, and having said as much as that, I do not think we can say much more.

Clinton H. Crane: I should like to ask Prof. Sadler if he could add to the paper a little fuller record of the forms which were tested. It seems to me that if the intention is to given us information which we can use, that a knowledge of the forms is of great importance. The results of themselves are, of course, interesting, but the results without the forms and without the actual speed at which the tests were carried on, the actual draughts of water, are not nearly so valuable. Perhaps I am asking more than the professor wishes to give us, but I feel that in a paper of this sort, which, as Prof. Peabody says, we have got to accept as correct, that the more information of an exact nature we can have, the better we can analyze it.

Prof. Sadler: I would be very happy to give this information. It occurred to me that the number of plates in our *Proceedings* was, perhaps, getting rather large, and I thought at one time of putting in the general body plans, but thought that the information given on each curve, which is the ratio of length to breadth, and breadth to draught, block, prismatic and midship section co-efficients, would more or less fix the forms in the minds of most of the members. However, if it is so desired, I shall be very happy to add the information Mr. Crane wants, if the society sees fit to publish it. I might say in connection with the speed, I have reduced those all to speed-length ratios, and depth-length ratios, so they are all independent of actual speeds or depths at which they were made. There is a ratio of depth of water to length of ship, and depth of water to draught of ship, and of speed-length ratio as well.

Experiments on the Froude

PROF. C. H. Peabody's paper, entitled "Experiments on the Froude", was then read by the author. The inception of these experiments was due to the late Dr. Charles G. Weld, of Boston, a representative of an old New England family of ship owners and an enthusiastic yachtsman. He conceived the idea that there are certain distinct advantages in making experiments by the aid of navigable models on the resistance and propulsion of ships and undertook to provide the means while entrusting the execution of his ideas to Prof. Peabody. The preparation of the model and its machinery and the prosecution of the experiments were made by the staff of the department of naval architecture and marine engineering of the Massachusetts Institute of Technology. The prototype chosen for investigation was the revenue cutter Manning, which was tested by Prof. Peabody under favorable conditions in 1899. The model was made one-fifth of the length of the Manning. The Manning's length between perpendiculars was 188 ft. and the Froude's 37.60 ft. Though properly called a model, the Froude is really a miniature steamer behaving like a ship and not at all like a steam launch. The experiments consisted of making a series of progressive speed trials over a measured course an eight of a knot long in the Charles river basin. The paper was naturally of an elaborate character and impossible of intelligent condensation in a limited space.

Discussion of Prof. Peabody's Paper.

Prof. H. C. Sadler: I regret I have not been able to examine this paper with the detail I should like, and which I intend to do in the future, but I think that Prof. Peabody is to be congratulated on the good work he is doing in this connection. I have always felt that the determination of weight in the ordinary model tank was open to a certain amount of doubt. The quantities measured are comparatively small, the propellers used are also small, and I think that estimates of weight may under these conditions not be very accurate.

Here we have a much larger scale experiment than is possible with the ordinary tank, and I think in that way, perhaps, Prof. Peabody may be able to give us in the future some more definite values of weight, as it is ordinarily understood, than that which we have at present.

The results shown in Table 9 are very suggestive in that connection, as well as the diagram in Fig. 11, showing the variation of the weight in terms of distance of the propeller from the ship.

The influence of the form of the vessel upon weight is another point which I hope Prof. Peabody may be able to take up in the near future, if it is possible to remodel the stern of the vessel without much trouble; change the stern water line somewhat and find the effect of that upon weight, and I think it will be of great advantage as throwing further light upon the stream line at the stern of the ship.

Clinton H. Crane: Mr. Peabody's experiments with the Froude are extremely interesting. I do not think that I have the right to claim to being the father of such a method, but back in 1905, in connection with a paper which I read, I suggested the great value of experiments performed on small launches with reference to the effect on larger sized vessels.

Value of Models

On the other side, when I was on the East Coast, I saw a model which was made of the Mauretania, and run back and forth in one of the docks, in an endeavor to obtain a good deal of the sort of data which Mr. Peabody has given to us, and which I believe the experimenters on the Mauretania model kept to themselves.

That same year I saw a large model, about 50 ft. long, at Denny's, and they said, in spite of their model basin, they felt for certain propeller problems it was necessary to carry on tests similar to those Prof. Peabody carried on.

We have found in our own experiments that what we have done with the smaller launches has been of the greatest value in predicting, not only the speed, but the behavior of the largest size vessels. Launches from 20 ft. to 40 ft. long have given us most valuable information, and in banking on what we found from them we have not gone wrong.

I believe there is a possibility of small errors creeping into any such investigation. I do not believe a model ship by even the best ship yard will be an exact representation of the large sized ship. She will be near enough for practical purposes, but there may be differences which would tend to account for the 15 per cent.

Moreover, the surface of a model which is kept in the water for testing, very soon loses a definite factor. We find in our racing boats that after a week to ten days it is absolutely necessary to take the boat and

put her in fresh condition, otherwise she is badly beaten.

I am only giving these thoughts as an addition to Mr. Peabody's paper, which seems to be of very great value to the members of this society, and to every student of naval architecture, and I regret with Prof. Peabody that Dr. Weld is no longer living, and I hope that this may not be the stoppage of these valuable experiments.

Discussion by Capt. Hovgaard.

Capt. W. Hovgaard: I will say a few words concerning the question of residual power. I carried out some years ago an analysis of the residual power and residual resistance of a great number of ships. The result was published in the *Transactions* of the Institution of Naval Architects, in London. There I found that the residual resistance as we see it is as the power of the speed, that is, on the average, not considering the fluctuations due to the bow and stern wave stream, and particularly at the moderate speeds, that the residual resistance would be nearly as the forced power of the speed.

Now, if we look at these results on page 14, it will be seen that the discrepancy between the residual power curve and that from the ship is greatest at the lower speed. With a speed length ratio of 0.80, we find the residual power 58, and the residual power of the model 126, showing that only at these lower speeds the residual power must be greater.

I think this paper bears evidence that such experiments are extremely potent of results, and it will be very much to be regretted if they cannot be carried on in the future.

Wm. T. Donnelly: I do not know that I can add anything in particular to the discussion, but I ask Mr. Peabody if he can give us some information as to what, in his judgment, would be the nature of the decreased resistance of the model, or increased efficiency on the propeller, on account of its being moved farther from the stern post. It seems to me to be a real factor of design, and, of course, in construction we try to keep the propeller well up against the stern post, to locate at that point, and we want to understand if we could reasonably expect an increase in efficiency by elaborating the design and carrying the propeller further away from the stern post. Is this higher efficiency due to the less action of the propeller on the form of the boat, giving it a higher efficiency as to form, or is it due to the stern post? It seems to me from the curve it might be due to the reduction of the effect of the propeller on the after form of the boat, the tendency to reduce the pressure on the stern line of the boat, it appearing that the further it is removed away the less effect it would have. I should be pleased if Mr. Peabody can throw any additional light on that point.

Prof. Peabody's Reply.

Prof. C. H. Peabody: I want to thank Prof. Sadler for the criticism and appreciation he has given of this paper. I want also to take an opportunity to thank him now, as I could not consistently do in my acknowledgments, for giving me a very important piece of work in connection with the experiment I was carrying on.

Having anticipated this difficulty about surface friction, I fondly imagined I could do some work on that on my own behalf. I will not go into the details of that, because it was a failure. I could not understand why Prof. Sadler, with his model basin at Ann Arbor, was able to find out what the trouble was and show me. I can thank him for that now, but as I had to drop out my own work in that line from presentation, it did not seem possible to include his name in the statement which I desired to make.

In the suggestion made by Mr. Crane, there is no question that in his work on launches he may proceed from small launches to larger launches with the greatest possible advantage. That is also what has been done in the cases he referred to, in the model of the Mauretania, the model tested by Denny's and the work done upon the Froude. That is, these were all models of a full sized ship. Let us note, however, that they are not toys. Perhaps we believe that models 20 ft. long are not toys. The model of the Manning had a displacement of eight tons. She handled like a little steamer, and especially when she was given rudders to enable the propeller to go to stern, she behaved rather badly. I speak of this, because I believe that is what Mr. Crane has in mind, that from experiments on the smaller craft you can get the greatest advantage in the design of larger craft of the same sort. Of course, you cannot go from launches to ships,—a launch is not a ship on a small scale; it is a different craft. I do not think that the difference in their form, or perhaps accidental differences in displacement of models, will have any appreciable effect upon the experiments, not when they are carried out with reasonable care. I do not believe it has any effect.

As for the surface of the Froude, the Charles river basin, as was stated in the paper, is now fresh water, and we have taken pains to have the Froude kept painted and repainted, also keeping the surfaces scraped clean; as a matter of fact, the surface was clean the whole season and was not subject to fouling, and there was no appreciable loss of efficiency from that cause.

I am very much interested in the statement made by my colleague, Capt. Hovgaard, in regard to his residual resistances.

As to the question asked by Mr. Donnelly, the experiments and especially the diagram to which he referred, show very clearly that on the Froude, and probably also on the Manning, the prototype, the propeller was much influenced by being set immediately astern of a wide stern post.

The Frahm Anti-Rolling Tank

A considerable development has lately taken place in the application of the Frahm anti-rolling tank to passenger vessels, and at the present time there are no less than 17 passenger ships fitted, or being fitted, with tanks of this description. The principle of the tanks and their successful application in the case of the steamers Ypiranga and Corcovado have already been referred to in the THE MARINE REVIEW. *The Ship Builder*, Newcastle-on-Tyne, says that their efficiency under actual conditions at sea has now been further demonstrated in the case of a third vessel, the steamer General, of 13,620 tons loaded displacement, belonging to the German East African Line, as will be seen from a typical record (Fig. 1) of this vessel rolling with and without the tanks in action, taken on March 10, 1911. In the case of the General the tanks are placed in the hold, as shown in the section Fig 2 and plan Fig. 3. It will be seen that two tanks are provided adjoining one another, one having a length of about 24 ft. and the other 15 ft., so that the quantity of water in action can be regulated to suit the variation of metacentric height during the voyage. The side chambers are about 10 ft. wide; and it will be noticed that, in order to keep the inner tank top a reasonable height above the top of the double bottom and yet have the

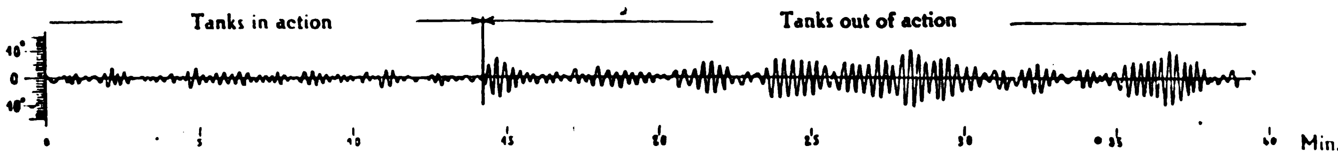
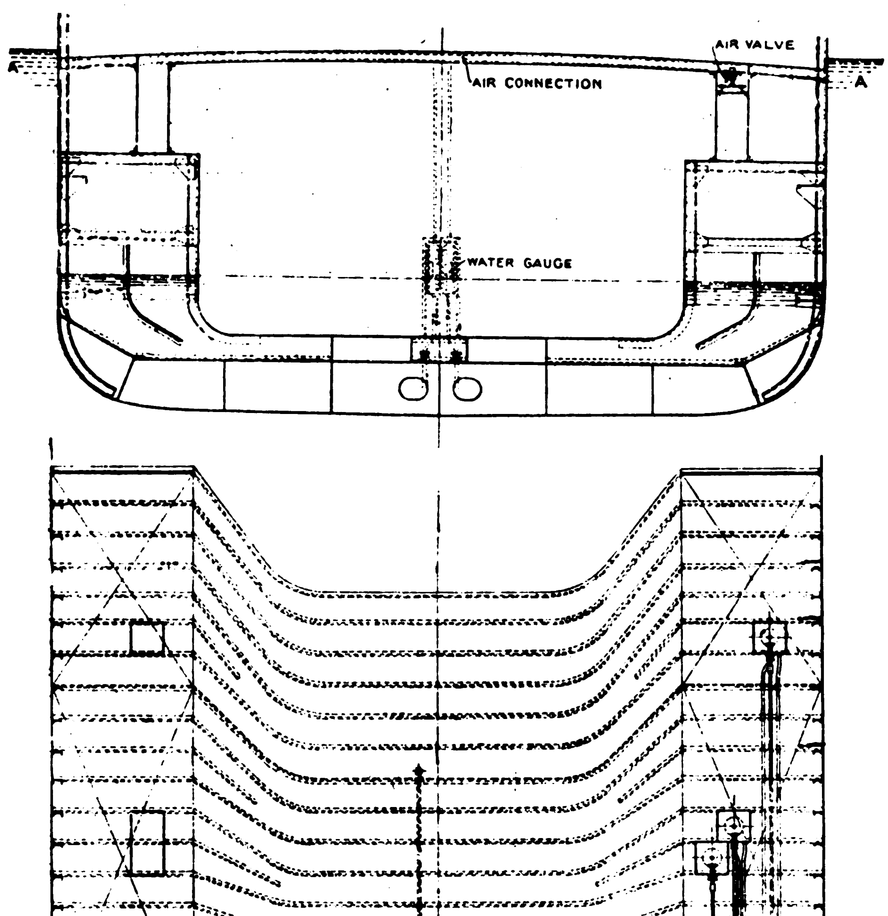


FIG. 1—STEAMER GENERAL. DIAGRAM OF ROLLING

proper contraction of area in the cross channel for regulating the speed of flow of the water from side to side, the cross channel has been gradually contracted in a fore and aft direction as it approaches the centre line. The success achieved in the three vessels referred to has induced the Hamburg-American Line to have anti-rolling tanks fitted in their large Atlantic liners Amerika, Auguste Viktoria, Cleveland and Cincinnati, in the former Deutschland now converted into a tourist steamer under the new name of Victoria Luise, in their gigantic vessel Imperator building at the Vulcan yard, Hamburg, and in the sister vessel to the Imperator building by Messrs. Blohm & Voss. Other German owners who are adopting the device for their ships are the Hamburg-South American Co., in the case of their new steamer Cap Finisterre building by Messrs. Blohm & Voss, and the Woermann Line in their new passenger vessel Henry Woermann also building at Hamburg. The Cunard Co. are also having anti-rolling tanks installed in the Laconia, now completing at Wallsend. In the Laconia the tanks are being built in the cross bunker forward of the forward boiler room, their arrangement being somewhat similar to that adopted in the General. If this experiment proves successful, it is stated that similar tanks are to be fitted in the Aquitania, building at Clydebank, by Messrs. John Brown & Co.



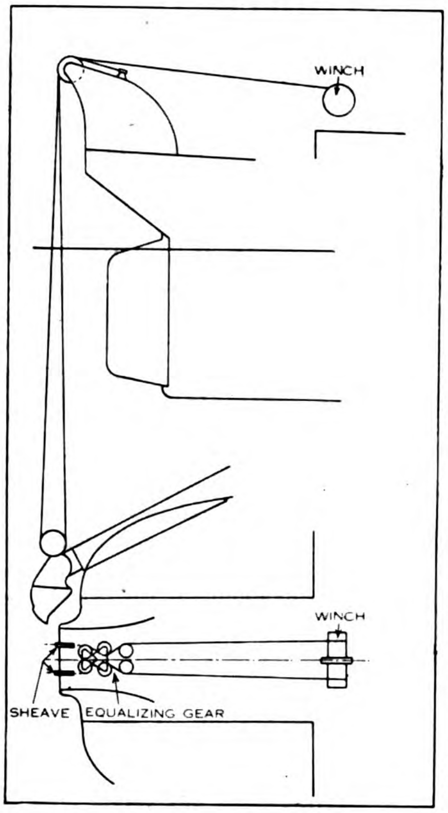
FIGS. 2 AND 3—STEAMER GENERAL. SECTION AND PLAN OF ANTI-ROLLING TANKS

Cutter Head of Dredge New Orleans

One of the most interesting features of the new government dredge New Orleans is the arrangement of the suction pipe and cutter head and the manner in which they are operated, together with the method and machine by which they are kept under constant control and regulating for dredging. The New Orleans is for service in the Southwest Pass, at the mouth of the Mississippi. She is being built by the Fore River Ship Building Co. She is 315 ft. long, 50 ft. beam and 26 ft. depth of hold. Her hoppers will hold 3,000 cubic yds. Her coal bunkers have a capacity of 300 tons and she will make 10 knots an hour.

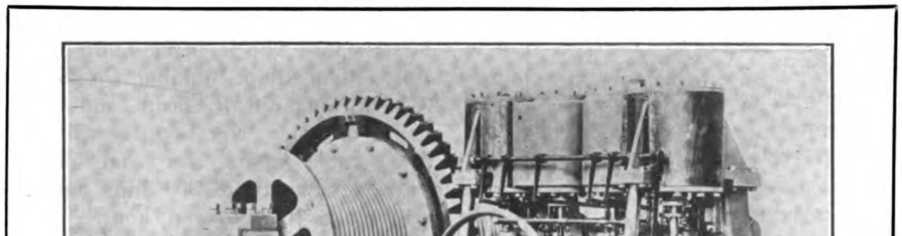
The suction pipe is 20 in. inside diameter. The pipe is hinged near the stern of the ship by hollow trunnions with the suction head at the after end. The pipe is lowered through a well in the center of the stern and the suction head operates like a scraper bucket by being dragged over the bottom as the ship moves forward. The suction head is like a huge enclosed rake with sharp cutting teeth through which water is forced at a high pressure to aid in breaking up the dredged material so that it will pass freely through the suction pipe. The head is 18 ft. wide athwartship and about 5 ft. across in the fore and aft direction. It is evident that in order that the cutter head may operate at full capacity and at the same time not

dig so deeply into the bottom as to clog it or anchor the vessel that it must be completely under the control



LEADS TO WINCH

of the operator as to the depth to which it is working. For this purpose it is suspended from the stern of the ship by wire ropes as shown in the drawing herewith. There are two


WINCH AND ENGINE

of these ropes. One end of each rope is made fast to the ship. From there it passes over a bracket at the stern, drops to a sheave on the cutter head and returns to a sheave in the bracket and from there goes to one of the two drums of the winch which controls the depth of cut. Between the stern sheaves and the winch the ropes pass over the sheaves of an equalizer device which keeps the tension the same on each of them.

The central winch is of a type which enables one man to regulate the depth of cut with practically no physical exertion, to change the position of the cutter from moment to moment as may be required and to raise or lower the heavy head and suction pipe as he pleases. It was designed and built by the Lidgerwood Manufacturing Co., of New York, on purpose for this work. In effect it is a double side-by-side drum winch of the steering engine type. In fact, except for a difference in the drums, it is almost a duplicate in design of the many tiny steering engines built by the Lidgerwood Manufacturing Co. for the United States torpedo boat destroyers except that it is of great size and power. It has the same compactness of design, reliability and ease of operation and high quality of material and workmanship called for in steering engine practice, and the control is through a hand wheel of equivalent type. The engine itself is controlled by a reverse valve system. By merely turning the control wheel the operator raises or lowers the cutter head as desired, the drums following closely the movement of the wheel and holding the weight of the head and suction pipe at any point where the wheel is left at rest.

The engine has two upright cylinders each 12 in. in diameter by 12 in. stroke. To the crankshaft is coupled a Hindley worm made from a steel forging, which is provided with roller thrust bearings. The worm wheel is of bronze. There are two spirally grooved drums, made fast, one on either side of the worm wheel, on which the lifting ropes are coiled. The engine has a lifting power of 40,000 lb.—20,000 lb. on each drum—and it hoists at a speed of 50 ft. per minute. The winch is well shown in the accompanying illustration made from a photograph taken in the Lidgerwood shops just after the engine was tested and officially inspected.

Steam Trawlers Surf and Swell

The steam trawlers Surf and Swell were launched on Dec. 9 from the yard of the Fore River Ship Building Co., Quincy, Mass. Following are the general dimensions:

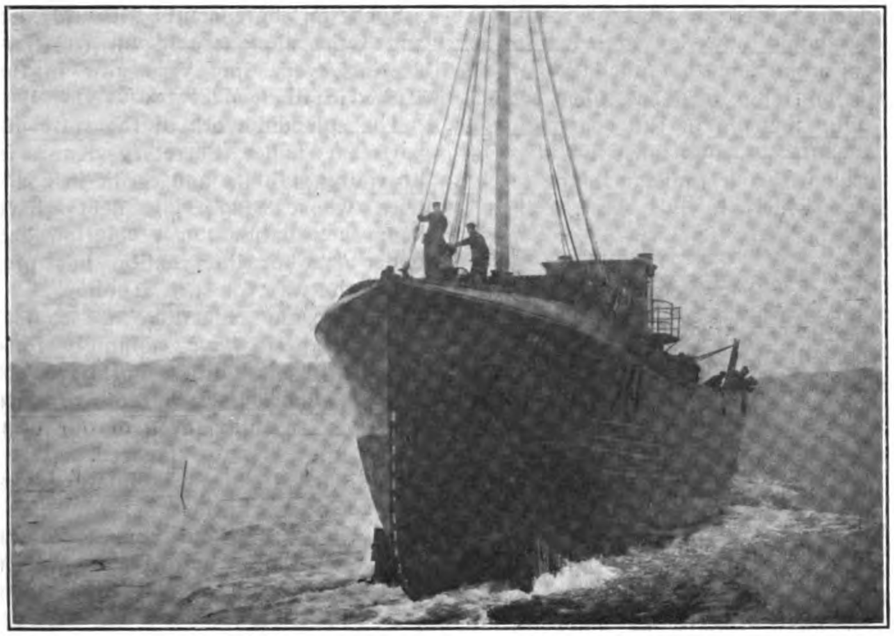
Length between perpendiculars	120′ 6″
Length overall	129′ 6″
Breadth, moulded	22′ 6″
Depth to main deck	13′ 6″
Mean designed draught	10′ 6″
Indicated horsepower	400

These vessels have straight stem, semi-elliptical stern, raised quarter deck and turtleback topgallant forecastle, and are rigged as pole masted ketches. The fish hold has a capacity of 50 tons of iced fish, is insulated throughout with cork and sheathed with spruce, and is divided into bins fitted with portable sides so that the catch after being sorted in the ponds on deck may be stowed, having the different classes of fish entirely separated.

On the main deck directly over the fish hold there is an ice crushing machine through which about 10 tons of commercial blocks of ice can be fed into the hold, broken up into small pieces of a size best suited for the preservation and stowing of fish. The engine for running this ice crusher is so arranged that it can be used for handling the cargo on arrival at the fish wharf.

There is a turtle deck forward, and upon this deck is located the anchor-handling gear. On the main deck forward there is a steel deck house containing lamp and paint rooms and entrances to the forecastle and cargo. On the quarter deck aft and embodied with the engine casing is another deck house of steel which contains quarters for two firemen and entrance to the cabins and engine room. In the forecastle are pipe berths and lockers for the accommodation of 14 men with a galley and mess room located just aft of the forecastle con-

taining a shipmate range, refrigerator and ice box and the necessary equipment and outfit for the accommodation of the entire crew and officers. In the after cabin there are four berths with the usual lockers, seats and table as required for the accommodation of the ship's officers. The captain's cabin is located on the port side and a cabin with two berths for the engineers on the starboard side.



STEAMER TRAWLER SWELL

For handling the trawl nets and otter boards there are the usual gallows frames and an 8-in. by 14-in. double drum winch supplied by the Hyde Windlass Co., together with the necessary revolving bollards and fittings to give the required leads or trawl lines.

The vessels are lighted throughout by electricity, the generator set being one of 2½ kilowatts, 110 volts, built by the General Electric Co.

Steam is supplied by one Scotch boiler having a working pressure of 180 lb. and is of 12 ft. 6 in. mean diameter and 10 ft. 6 in. long, with two Morrison suspension furnaces 42 in. diameter having a heating surface of 1,568 sq. ft. and a grate area of 42 sq. ft. The main engine is of the triple expansion vertical type having cylinders of 12¾ in., 22 in. and 36 in. diameter by 24-in. stroke, developing 450 indicated horsepower at 110 revolutions per minute. The condenser is cast onto the back columns of the main engine, and the air, bilge and feed pumps are driven off the intermediate pressure crosshead.

The Panama Canal

By Lewis Nixon.

That commerce will be stimulated by the opening of the Panama canal is generally admitted, but that its advantage will be uniform to all countries is, of course, impossible.

This is because some nations are keenly alive to the desirability of conserving the material interests of their people, leaving to other countries the task of looking out for their own.

So it will follow as it always has in the past that in the readjustment of commercial conditions, to be brought about by the opening of our canal, the nations who jealously safeguard their interests and utilize to the utmost possibilities confronting them will profit more largely than those who are indifferent.

The men who framed our constitution and who in congress later carried out its intentions and ideals in laws, thoroughly understood that the three pillars of national greatness and prosperity were commerce, agriculture and manufacturing.

Patriotism and not political expediency was the moving spirit and a handful of men, in debt, without resources or credit, with the fear of no country in their minds and with an eye singly to the progress of the United States of America enacted legislation that quickly gave us wealth, power and population.

We all know that departure from the wise policy of our forefathers was coincident with the beginning of the decline of our merchant marine, while other nations have become strong and rich through utilizing the opportunities we have thrown away.

We are always told that we had to develop our internal resources. That is true, but had we adhered to our original constitutional maritime policy we should have saved the money necessary for such development instead of turning over vast profits to others to be reinvested here and make a vast drain forever upon our earnings.

Our Shipping Dependence

It is said by those always eager to find excuses for continuing our dependence upon the oceans that our foreign trade is mounting now to vast proportions. To students of the strategy of trade it is apparent that had we our own plant, and world-wide trade connections we once had, that our foreign trade would be far greater than it is now. The doctrine of being satisfied with half a loaf when we can get loaves should not appeal to progressive Americans.

The doctrine of live and let live is altruistic, but when a nation ceases to progress or grow it dies.

A boy may be strong and powerful as a youth, but once grown to mature manhood and strength a shrinking back to youthful stature would indeed be pitiful.

We neglect the commercial pillar although the proportion of exports which consists of foodstuffs and staples that foreign countries must have to feed their people and their factories is falling, while the proportion of manufactured commodities in which we have to meet the competition of the world is increasing.

Reliance upon the sophistry that the reason others carry our goods is that they can do it cheaper than we can means the gradual coming of hopeless and entire dependence upon others to do our work. Charges are always all the service will bear.

A country without the will or capacity to look out for its own interests will soon have no interests worth looking after.

Factor of Ocean Transportation

I need not point out here how large a factor ocean transportation is in the sum total of national prosperity nor do I wish to discuss here the means for revival of our merchant marine to a tonnage in the foreign trade adequate to our needs.

What this society probably wants to know is, are there means by which the vast sum spent for the Panama canal can be of help to the varied

*Read before the Society of Naval Architects and Marine Engineers, New York, November, 1911.

interests of this country instead of furnishing issues of bonds with which to aid the continuance of our present currency system, the existence of which is as much a tax upon us as is the non-existence of a merchant marine?

Several of the European nations rebate the toll charges of the Suez canal to the vessels flying their respective flags.

But they did not build the Suez canal even though they may have shares in it. But we built the Panama canal with our own money through our own territory.

The great bug-a-boo of the present day that is dangled before the American public is that a treaty forbids whenever something must be done to protect our interests.

Why a self-respecting country could ever sign the Webster-Ashburton treaty I am at a loss to understand, but though supplanted in its provisions by the Hay-Pauncefote treaty many were willing to hearken back to the older treaty to our own undoing when it was proposed to protect our own by fortifications.

Of course our vessels passing through our own waterway should pass through free. But again a treaty forbids.

What is our manifest duty as an independent nation with the sovereign right to do as it will with its own? To give notice that in this respect the treaty does not bind us, and if this is questioned abrogate the treaty.

Now listen to the inspired chorus railing of breach of faith.

Bargains of this sort match privilege against privilege and it is not expected nor is it equitable that they should be one-sided. In this instance we are bound not to prefer our own ships, an enormous advantage given to our competitors. We are given permission to build the canal—a permission we should as a nation be ashamed to admit necessary.

A rebate to our own vessels would be a cowardly compromise. This canal is a thoroughfare through our territory and should be free to our vessels.

Our treaty makers up to the last few years have unhesitatingly swapped American rights for doubtful considerations which have usually turned out worthless.

Congress, seeing this fatal tendency to dicker, after the war of 1812, when we made the much-to-be-regretted treaty of 1815, stopping our constitutional right to regulate commerce in direct foreign trade, passed a law which at least removed one part of our marine from such hazard.

They passed a law confining the coasting trade to United States vessels. This remnant of the inspired legislation of the patriotic men who enacted our early navigation laws stands today—a monument of constructive legislation. Without it we should have lost the demand for coasting vessels that kept alive the flickering flame of ship yard capacity which roused by the proposal that we should buy our first man-of-war in Europe laid the foundation of the splendid ship yards we have today.

Our tonnage in the coasting trade is enormous, but must not be confused with our tonnage in the foreign trade which, in 1911, is less than it was in 1811.

Fight for Recognition

To one man in this country, more than all others, who fought for years for the recognition of the American ship builder, Charles H. Cramp, do we owe our present navy. Beaten at one point and having to permit the building of hulls here, American doubting Thomases begged that we import the machinery and the splendid patriotic stand taken by Secretary Whitney, when he declared hull and machinery should be built in the United States if built at all, was based to my knowledge upon his faith in the promises of Mr. Cramp. This was no disparagement to the splendid work done by John Roach, Taylor Gause and others, but Charles H. Cramp made the fight and won.

He could not have done so had it not been for the coasting trade law, for his great abilities would have been forced into other channels.

We still have this law left after the betrayal of the obligations of congress to regulate commerce in American interest by the repeal of the earlier laws that did so.

Stimulating Ship Building

Can we use this last prop by any extension of it to our advantage and to still further stimulate ship owning and ship building?

Happily, we can. Mexico, Central America, the West Indies, and the northern shores of South America are at the door of the Panama canal. As trade and transportation focus to the Isthmus and the governments surrounding it become stable and safe fields for investment so that their vast potential resources may contribute to the world's commerce, I look to see in a few years the Caribbean sea and the Gulf of Mexico girdled by prosperous cities with trade rivaling in activity and prosperity the cities of the great lake basin. By treaties with these countries we should extend our coasting laws to them with the understanding that all vessels owned and operating under the flags of either party to that treaty, say on Jan. 1, 1912, shall enjoy reciprocal liberty of commerce in the ports of either party, after that date vessels constructed in either country to have the same privilege.

Such an agreement with Mexico and Cuba alone would fill to overflowing every ship yard now in the United States.

The splendid work of the state department under Secretary Knox in providing stability and credit in countries whose staggering debts have kept such nations in revolution and under fear of intervention has prepared the way for such a policy.

Is there any objection? Of course! Treaty experts have cunningly foreseen such possibilities and have got us to bind ourselves not to give ourselves anything, even of our own, unless they too are favored.

Are such treaties absolutely essential to doing business?

Of course not, our commerce was most flourishing before the greater part of our commercial agreements were made.

What is the hindrance to legislation in our own interest?

American public opinion manufactured in Europe.

I cannot end this paper without saying that my earnest conviction is that we must return to our early policy of discriminating duties and tonnage taxes if we are to revive our merchant marine in the foreign trade and that I am sorry that I cannot see the advantages, as conditions now exist, of the Panama canal other than as a war measure and as an altruistic enterprise in which charity begins abroad. Commodities leaving our borders are not marketed by us, are not carried by us, are not underwritten by us and are not financed by us. The cream of commerce goes to others who do these things for us.

There has been much said about the establishment of mail lines to South American ports. Such lines have, unlike a subsidy policy, constitutional warrant, and their establishment is clearly within the power of congress.

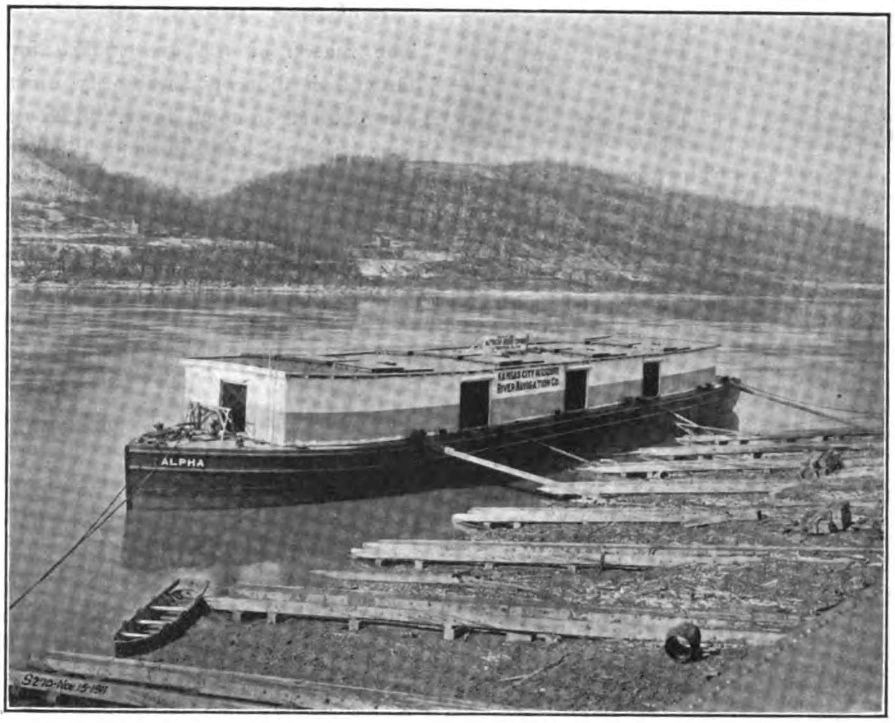
Outlining the Proper Doctrine

In the establishment of such there are two points needing attention. We must not gage our service by comparison with existing ships running from the United States to South America, but by comparison with ships running from European ports.

The proper doctrine is as follows:

That vessels running from the ports of the United States to the ports of other American states, should be at least equal in comfort and convenience to those from any port in Europe, and of such speed, that duration of voyage under analogous conditions, shall be less from the ports of the United States than from great commercial ports of Europe.

Another vital point is that good business calls for foresight in renewals. It is foolish to spend our money for a fleeting service and when we see newer and better ships constantly added to foreign lines, we should realize that we must do the same in the way of keeping up a competitive service. So contracts should not be for short terms. As the necessity for new ships arises owners should not find themselves with a few years to run at the end of which they may have ships on their hands with no place to use them. Personally, I think 30 years the absolute minimum for such contracts. In this way, as needed, new and better vessels will be added and the older vessels will go into the freight or the accommodation and reserve service so essential to a growing line.



STEEL BARGE FOR PACKAGE FREIGHT TRADE BUILT BY THE AMERICAN BRIDGE CO., AMBRIDGE, PA.

American Bridge Co. Building Barges

The American Bridge Co., at its plant at Ambridge, Pa., is building six steel barges for the Kansas City Missouri River Navigation Co., which operates a barge line between Kansas City and St. Louis. Two of the barges have been completed and one of them is shown in the accompanying illustration taken while the barge was still at Ambridge. The barges are 200 ft. long, 36 ft. beam and 8 ft. deep. The deck house extends practically from stem to stern and is intended for carrying carbo. As shown in the photograph, the roof of the deck house is provided with hatches with sliding covers in order to permit the rapid handling of cargo by means of cranes. Each barge has a capacity of 1,000 net tons on 6 ft. 6 in. draught. The American Bridge Co. has just completed ten barges of similar design for transporting steel products from the Pittsburgh district mills to the west and south. The first of these, the Ambridge, carried a cargo of 14,000 kegs of nails to New Orleans. In fact, during the past year, extensions to the shops and ways of the American Bridge Co.'s plant at Ambridge have been made so that today it has the largest and best equipped boat and barge yard on the western rivers. Its location at the headwaters of the Ohio is admirable for securing the steel direct from the Pittsburgh mills and enables delivery of the completed hulls and barges to be made readily to any section of the Mississippi, Missouri and Ohio valleys. Barges have been built for carrying all kinds of bulk freight—coal, oil, sand, stone—but the barges now under way for the Kansas City Missouri River Navigation Co. are the first that it has built for the general package freight trade.

Olympic Held at Fault

The decision of the British admiralty court holding the White Star liner Olympic responsible for the collision with the government cruiser Hawke in the English channel on Sept. 20, was a great surprise to the maritime world and the decision has been challenged in many quarters. However, it was doubtless arrived at after a searching examination of the mass of evidence submitted to the court and obviously no matter how full newspaper reports may be the court alone is in possession of all the facts. The thing that impresses the navigator, however, is that the Olympic signalled her intention to the Hawke and it does seem as though the Hawke need not have crowded herself into the narrow channel that she knew the Olympic was going to occupy. The collision was needless and could easily have been averted. The case is of unusual interest because it is the first time in English jurisprudence that the question of suction, so common on the lakes, has been involved.

Sir Samuel Evans delivered the opinion for the admiralty court. After describing the vessels and the nature of the collision, he said:

"The evidence established the fact that the vessels were never on parallel courses. He thought the Olympic, having the Hawke on her starboard side, ought to have got out of the Hawke's way, and that the Hawke was never the overtaking vessel. If any vessel was 'overtaking', it was the Olympic. He was of opinion that the tests that had been carried out bore out that decision. He accepted the suction theory advanced by the Hawke, and was satisfied that she did not starboard, as alleged. The cause of the collision was that the Olympic came too close to the Hawke.

"His Lordship said he found the Olympic had failed to establish her contention that the Hawke was the overtaking vessel, and that the Olympic did not keep out of the Hawke's way, as she should have done. He found that the vessels were crossing vessels, and the collision was solely due to the faulty navigation of the Olympic's pilot."

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The Lake Season of 1911

The season of the great lakes for 1911 ended more satisfactorily than it began. It opened in a state of great lethargy and upon a falling market, but closed in a state of comparative activity and upon a rising market. The season as a rule was most unsatisfactory to vessel owners. The ore trade is, of course, the dominant trade of the lakes, but the demand for ore was so light in the early months that it became clear that the usual quantities could not be moved. In fact, the movement was over 10,000,000 tons less than that of the preceding year, which in turn meant that a great many ships could not be operated at all. Even with the heavy movement of 1910 not all of the ships could find employment. Fortunately the coal and grain trades were somewhat heavier than usual, notably coal, which served to mend the situation in part. In fact the ships that moved these commodities on their closing trips made more money on that single trip than they did in the full season. A succession of storms during November tied up contract ships so effectually that those shippers who had coal and grain to move were compelled to pay fancy prices for vessels.

The price of ore was advanced 50 cents a ton in 1910, but the state of business was such that the advance could not be held and it was reduced 50 cents, making it the same as in 1909. The freight rate fell in sympathy, being 60 cents from the head of the lakes, 55 cents from Marquette and 45 cents from Escanaba. This was a reduction of 10 cents from the 1910 rate, but is in effect the same as the rates which prevailed in 1908 and 1909, owing to the cut that was made in the unloading charge during 1910.

Many things, however, conspired to make it hard sledding for the vessel owner, especially the independent one. Stages of water still continue low and the great carriers are unable to load to their full depths. Practically all of the ore movement was carried in contract ships, the shippers carrying a greater portion of it in their own vessels than ever before. Owing to the fact that the ore movement was light in comparison with former years with consequently fewer vessels in the trade, dispatch was excellent. Both shipping and receiving docks established records and round trips were made faster than ever before.

It is clear also that vessels are being operated more carefully than in the past, as the number of accidents was much less than usual and few of them were serious. The insurance was reduced from 6 to $5\frac{3}{4}$ per cent during the year and it is quite likely that the underwriters have made money at this figure. For this state of affairs the Great Lakes Protective Association is largely responsible, as it is continually emphasizing the necessity for more careful navigation. There are few companies that can afford to pay 6 per cent for insurance, but even at that figure the underwriters were not making money, owing to the heavy losses incurred.

The rail rate on ore from the mines to the shipping ports will be the horizontal one of 60 cents when the season opens next year, meaning a considerable saving in the cost price of ore delivered at the furnace.

Foreign Steamship Conference

The full bench of the United States circuit court in New York has overruled the demurrer interposed by the Hamburg-American Steamship Co. and other trans-Atlantic lines forming the Atlantic Conference against the government suit for their dissolution. In rendering the decision of the court Judge Noyes swept aside the contention that steamship passenger business cannot be classed under the head of commerce. He said that the transportation of passengers between the United States and Europe formed a part of the commerce of the United States with foreign nations and that congress had the power to prohibit all contracts, combinations and conspiracies in restraint of the foreign commerce of the country. The

court held that the agreement between the companies affects foreign commerce because its operations must divert a part of the commerce from the natural channels of free competition into fixed channels assigned to the parties to the agreement. The contention that the combination was formed in a foreign country is immaterial as it affects the foreign commerce of this country and is to be put in operation here. The exact language of the court is as follows:

"The agreement directly and materially affects foreign commerce and is partly intra-territorial, because it is to be carried out in part in the United States. Confining ourselves to the eastbound traffic, it is evident that the contract contemplates the solicitation of business, the making of contracts of carriage, the taking on board of passengers and the actual commencement of transportation within the territory of the United States. It requires acts to be done in this country; such acts are as material and essential as those to be performed abroad, and the part of the contract requiring them cannot be separated from the remainder.

"The prohibitions of the anti-trust statute apply broadly to contracts in restraint of trade or commerce with foreign nations. This contract directly and materially affects such commerce, and if it unlawfully restrains it, it comes within the statute.

"We see nothing to warrant the contention that the act should be narrowly interpreted as prohibiting only contracts which are to be performed wholly within the territorial jurisdiction of the United States, nor —if it were for us to consider—any reason for concluding that a broader construction would lead to international complications."

Olympic-Hawke Collision Case

The decision of the admiralty court in the Olympic-Hawke collision case will be read with interest everywhere. The Hawke collided with the Olympic in the English channel on Sept. 20, striking her on the starboard quarter and punching a deep hole both above and below the water line, necessitating extensive repairs to the liner. The early accounts seemed to indicate that the cruiser had attempted to cross the Olympic's bows but that later endeavored to get under her stern. According to the decision this appears not to have been the case. The court has held that the courses of the two vessels were crossing rather than parallel and holds the Olympic to blame for approaching too close to the cruiser. What actually happened when the vessels had come within a certain distance of each other is that the Hawke was irresistibly drawn to the Olympic by the suction of the greater ship. This particular phase of the case was demonstrated to the court by Naval Constructor David W. Taylor, of the United States navy, who has made elaborate experiments of the effects of suction in the tank at Washington. This force has long been known on the great lakes where ships are constantly meeting each other in restricted waterways. Suction has figured extensively in lake collision cases, but this is the first time that it appears to have attracted any attention abroad. The force of suction is so generally recognized on the lakes that it is avoided altogether. Most steamship companies have given strict orders to their masters as to how nearly they may approach other vessels in the rivers.

The sympathy of the practical navigator is, of course, with the Olympic in this unfortunate occurrence. When the vessels sighted each other the Hawke had the Olympic on her starboard bow, while the Olympic had the Hawke on her port bow. Both vessels were proceeding for a narrow channel, the Olympic under a starboard helm and the Hawke under a port helm. The Olympic signified her intentions by a two-blast whistle to which the Hawke did not reply. If the Hawke was unwilling that the liner should take precedence she should have blown an alarm. The collision was the direct result of this failing.

Ore on Lake Erie Docks

Figures compiled by THE MARINE REVIEW from the returns sent in by the various dock companies show that iron ore receipts at the Lake Erie ports during the season of 1911 were 25,531,550 tons, out of a total movement of ore by lake of 32,130,411 tons. Lake Erie docks on Dec. 1 held a balance of 9,131,664 tons, which is the largest store on hand in the history of the traffic with the exception of last year when the docks on Dec. 1 held a balance of 9,426,881 tons.

During 1910 the total shipment by lake was 42,620,201 tons, of which Lake Erie docks received 34,042,897 tons and held a balance on Dec. 1, 1910, of 9,426,881 tons. During 1909 the total shipment by lake was 41,683,873 tons, of which Lake Erie docks received 33,672,825 tons and held a balance on Dec. 1, 1909, of 8,965,789 tons. During 1908 the total shipment by lake was 25,427,094 tons, of which Lake Erie docks received 20,414,491 tons and held a balance on Dec. 1, 1908, of 8,441,533 tons. During 1907 the total shipment by lake was 41,288,755 tons, of which Lake Erie docks received 35,195,758 tons and held a balance on Dec. 1, 1907, of 7,385,728 tons. The reserve of 9,131,664 tons is more than will be needed for winter consumption. Never in the history of the trade have 5,000,000 tons gone forward from dock to furnace during the winter season.

Shipments to furnace between May 1 and Dec. 1, 1911, aggregate 23,178,370 tons, compared with 30,060,096 tons in 1910, 30,077,304 tons in 1909, 17,453,258 tons in 1908, 29,737,018 tons in 1907, 27,615,392 tons in 1906, 24,311,720 tons in 1905, 16,658,806 tons in 1904, 16,903,013 tons in 1903, 18,423,364 tons in 1902 and with 14,204,596 tons in 1901.

The shipments to furnaces during the season of navigation, as referred to, are determined in this way: First, we have the amount of ore on Lake Erie docks as of May 1, last, 6,778,494 tons; add to this the receipts of the season just closed, 25,531,550 tons, and the total is 32,310,044 tons; deduct the amount on dock, Dec. 1, 9,131,664 tons, and we have 23,178,380 tons as the amount that was forwarded either direct or from dock to furnace yards. The ore on dock, as of May 1, as compiled from figures received from the dock companies amounted to 6,850,285 tons. This total, however, included April receipts, amounting to 71,791, which must of course be deducted before adding re-

ceipts for the season, which also include the April receipts.

It is, of course, understood that the difference between the total output of 32,130,411 tons, which was shipped from the Lake Superior mines during 1911, and the receipts of 25,531,550 tons at Lake Erie ports, is ore that went to places other than Lake Erie ports, such as the furnaces at Lake Michigan ports. The accompanying table shows receipts at Lake Erie ports and amounts on dock during six years past.

IRON ORE RECEIPTS AT LAKE ERIE PORTS, GROSS TONS.

	1911.	1910.	1909.	1908.	1907.	1906.
Toledo	493,345	1,225,202	1,374,224	680,553	1,314,140	1,423,741
Sandusky	....	....	11,088	....	83,043	35,847
Huron	223,947	197,951	243,082	213,377	971,430	778,453
Lorain	2,937,605	2,884,738	2,796,856	2,286,388	2,621,025	2,191,965
Cleveland	4,584,211	6,344,943	6,051,342	4,240,815	6,495,998	6,604,661
Fairport	666,365	1,516,434	1,734,277	1,518,961	2,437,649	1,861,498
Ashtabula	6,359,131	9,620,638	8,056,941	3,012,064	7,521,859	6,833,352
Conneaut	6,931,278	6,309,548	7,007,834	4,798,631	5,875,937	5,432,370
Erie	289,400	942,592	1,235,057	828,602	2,294,239	1,986,539
Buffalo	2,802,976	4,704,439	5,002,235	2,835,099	5,580,438	4,928,331
Detroit	243,292	296,412	159,889	....	....	....
Total	25,531,550	34,042,897	33,672,825	20,414,491	35,195,758	32,076,757

IRON ORE ON LAKE ERIE DOCKS,* DEC. 1, GROSS TONS.

	1911.	1910.	1909.	1908.	1907.	1906.
Toledo	661,382	433,215	332,456	590,925	518,645	281,000
Sandusky	2,471	17,728	39,557	36,079	44,546	17,467
Huron	344,371	375,118	477,333	458,158	415,730	245,499
Lorain	314,321	259,448	407,129	426,274	366,271	336,321
Cleveland	1,589,491	1,638,795	1,547,142	1,458,392	1,281,335	1,224,606
Fairport	636,566	839,970	867,640	835,821	523,981	590,783
Ashtabula	3,295,862	3,287,816	2,594,359	2,293,531	2,056,820	1,631,312
Conneaut	1,237,573	1,329,997	1,411,002	1,296,675	1,000,774	1,057,424
Erie	636,274	792,011	788,046	730,530	652,219	552,631
Buffalo	413,353	452,783	501,125	315,148	435,407	315,412
Total	9,131,664	9,426,881	8,965,789	8,441,533	7,385,728	6,252,455

Lake Michigan Ore Receipts

During 1910 Lake Michigan ports received a total of 7,452,084 gross tons of ore. It was natural, of course, that they should have received less this year than last, owing to the lessened movement in general, but it has more than maintained its proportion of the movement. Following are the Lake Michigan receipts by ports for 1911:

Port.	Gross tons.
South Chicago, Ill	3,685,100
East Jordan, Mich	36,232
Elk Rapids, Mich	26,814
Indiana Harbor, Ind	365,312
Milwaukee, Wis	109,255
Gary, Ind	1,302,745
Boyne City, Mich	33,000
Total	5,558,458

Vessel Losses During 1911

Lake vessel losses during 1911 aggregated 28, exclusive of the Tampa, Erwin L. Fisher and Turret Cape, which were total constructive losses. The Turret Cape is still on the rocks near Cove Island, Georgian Bay, and her release is a matter of some doubt. The Erwin L. Fisher and Tampa were both released and may again go into commission. It should be stated that the fine steamer Northwest was burned at Buffalo in the early summer, her interior being completely destroyed. She has not been rebuilt but lies in Buffalo boarded up.

The most serious loss of the year was the sinking of the bulk freighter John Mitchell, near Whitefish Bay, Lake Superior, in collision with the steamer W. H. Mack, three lives being lost on this occasion. In a monetary sense the total losses are not heavy, as practically all of the vessels that met with disaster were old ones. The annual wastage of the old wooden type is to be expected.

Of the total losses, 13 were caused by foundering, six by fire, five by collision and seven by stranding. Fire seems to be a frequent cause of destruction among the older type, though as the years go by losses from this cause will probably grow more rare for obvious reasons.

Subdividing the losses, they embrace 16 steamers, four schooners, five barges, five tugs and one yacht. The loss of this yacht constituted one of the singular accidents of the year. The yacht, named Gunilda, belonging to W. L. Harkness, stranded on a rock on Copper Island, Lake Superior, and was lost in the attempt to salve her. After the wreckers had pulled her off the rock she sank immediately in about 400 ft. of water.

Fifty-one lives were lost during the year, which is two lives more than were lost during 1910, but 70 less than were lost in 1909, when 121 met their death.

While accurate figures are not yet available, the probability is that the season has been more satisfactory from the standpoint of underwriters than any of recent years.

Accompanying is the table of total losses classified as to character of tonnage. It shows that the greater part of the tonnage was small and old.

Name of vessel.	Cause	Where lost.	Carrying Capacity, Gross tons.
STEAMERS.			
Arundell	Fire	Douglass, Mich	
City of Genoa	Collision	St. Clair river, abreast of Sarnia	3,300
City of Kalamazoo	Fire	Manistee, Mich	
Cranage, Thomas	Stranded	Outside of Tiffin harbor, Ont	3,250
*Fisher, Erwin L	Collision	Sault Ste. Marie	2,240
Hopkins, A. L	Waterlogged	Lake Superior	800
Joliet	Collision	St. Clair river, near Port Huron	2,777
Leuty, D	Stranded	Lighthouse Point, Lake Superior	1,500
Maine	Fire	Marine City, Mich	1,200
Mitchell, John	Collision	Near Whitefish, Lake Superior	7,500
Prince, F. H	Fire	Near Kelleys Island, Lake Erie	2,100
Raleigh	Foundered	Near Buffalo, Lake Erie	2,000
Rappahannock	Foundered	Jackfish Point, Lake Superior	3,450
*Tampa	Collision	Off Walkerville, Detroit river	3,400
Three Brothers	Stranded	South Manitou Island, Lake Michigan	875
*Turret Cape	Stranded	Near Cove Island, Georgian Bay	3,100
SCHOONERS.			
Burton, Lomie A	Foundered	South Manitou Island, Lake Michigan	1,100
Exilda	Foundered	Lake St. Clair	300
Howard, Kate	Foundered	Lake Superior, Round Island	350
Ottawa	Foundered	Near Sturgeon Bay, Green Bay	500
BARGES.			
Albatross	Foundered	Georgian Bay	
Keepsake	Stranded	Off Kelleys Island, Lake Erie	300
Kelley, Edward	Stranded	South of east breakwater, Port Colborne, Ont.	1,800
Marshall, J. D	Capsized	Near Michigan City, Lake Michigan	900
Young	Foundered	Near Middle Isl., Thunder Bay	1,500
TUGS.			
Eastern Star	Foundered	Lake Michigan	
Martin	Fire	Sandusky	
Martin, C. C	Foundered	Near Point Au Baril, Georgian Bay	
Silver Spray	Foundered	Outside Cleveland breakwater	
Winslow	Fire	Meldrum Bay	
YACHTS.			
Gunilda	Stranded	Off Copper Island, Lake Superior	

*Total constructive loss.

ANNUAL MEETING PITTSBURGH STEAMSHIP CO.

THE annual meeting of the officials and captains of the Pittsburgh Steamship Co. was held at the Hollenden, Cleveland, on Jan. 1, 2 and 3. President H. Coulby presided. He reviewed in general the record of the year, saying that the fleet had carried a larger percentage of ore than ever before. This, of course, does not mean that the Corporation moved more ore in 1911 than it did in 1910, but that a larger percentage of the movement was carried in its own ships.

The subject of upkeep and repair to the boats was discussed by A. F. Harvey, assistant general manager. H. A. Kelley, counsel for the company, addressed the masters on accidents and the rules of the road.

The annual dinner occurred on Wednesday evening. President Farrell, of the United States Steel Corporation, attended and delivered a brief address. A feature of the dinner was the presentation of gold watches to Captains George Burt, W. J. Hunt, H. J. Regan and Fred Hoffman, for rescuing life at sea. In this connection, Mr. Coulby said:

"My first thought was that tonight I would take up a little time as this is our eighth annual convention, and briefly run over what had been accomplished in the eight years that we have been having these annual meetings, but when the boys made up a list for me it seemed to be so long, and in looking it over I realized that all of you know full well what we have accomplished, and I think that I have told everybody I know at least once, and probably a great many more times, and in view of the fact that I have been doing a great deal of talking for the last three days, and whether you are tired of hearing me or not, I am pretty tired of talking, so I am going to skip that part of the program.

"I think, however, the greatest thing we have accomplished is the very fact of bringing us all together here tonight, captains, engineers, shore force, management and the generals of the army from New York.

Proud of the Fleet

"Now, gentlemen, I have said it a great many times, and I can say it again tonight, I am very proud of what we have accomplished. You all know the records I have been over with you during the past three days. Our people in New York know the record because we send it down to them, but there is one record we have made that I think I am more proud of than all the others, and that is what can be gathered from a few statements that I am going to read to you tonight. Probably in our early meetings you men smiled at me when I kept talking about discipline when I kept telling you we were a large organization and that we were very likely, on the lakes, to get the reputation that because it was the Pittsburgh Steamship Co., the dispatch we were getting and the way our ships were getting around, we were hogging it and our fellows were doing this, that and the other thing, and had no care or thought for the other fellow."

Mr. Coulby then read a series of notable rescues and continued:

"Now, gentlemen, I think we have established that other record I spoke of. The aluminum stacks had the reputation of being as well manned, if not the best manned boats on the lakes, did their business as cheaply, received as good dispatch and all those things, but we have added another record, and the aluminum stacks also stand as life-savers. We have demonstrated that we can do our business just as efficiently and just as economically as any other fleet, and in addition to that, we have got the time to stop and save human life. (Applause.)

Recognition of Steamship

"I was so proud of this that I could not avoid taking it down to New York and telling our people there about it, and they thought we ought to make some recognition of the excellent seamanship, good lookout and discipline on board our ships that enabled our men to do these heroic acts, and it was decided by the board of directors that in the four cases just mentioned, on behalf of the company, as a recognition of their seamanship and humanity, that we should present each of them with a gold watch and chain. On behalf of the company, it gives me much pleasure to present Captains H. J. Regan, George G. Burt, W. J. Hunt and Fred Hoffman with these watches.

"Now, before leaving this subject, I just want to read one more case that is entitled to honorable mention, and that is the case of the Malietoa. Gentlemen, this is what discipline does, this is what it means to have your men drilled, to have your boat drill and have everything ready at all times. Of course this happened on Lake St. Clair where the water was smooth, but I do want to call attention to it and to compliment Captain Rice on the excellent discipline on his ship, that he was prepared at 10:30 at night to get his boat overboard and rescue a man from the lake."

The rescues are described as follows:

Some Notable Rescues

About 5:45 p. m., May 1, 1911, when the steamer Bessemer, coal laden, was on a course from Point Betsie to Milwaukee, about 5 miles by Port Washington, we lowered a small boat and picked up a crew of four men who were clinging to the capsized schooner Kate Howard. The wind was north-northeast strong and a heavy sea running. It had been snowing nearly all afternoon and had cleared a little, and the temperature was about 32.

Capt. George Burt noticed considerable lumber floating around, and the mate remarked to him that some boat had lost her deck load. Capt. Burt noticed an object about 5 or 6 miles off to the westward. He telephoned aft to the engineer and the cook, telling them to get things in shape, as he was going to turn around, knowing she would roll pretty heavily in the sea. She came around all right and they had not gone very far when they could see what it was. There was an old lumber schooner with three men and a boy hanging onto the side. Capt. Burt did not think it safe to go alongside on account of the heavy sea, but he decided to get a small boat over and rescue them if possible, as he felt satisfied that the mates and the wheelmen could handle the boat, and they did everything that could be expected of them.

Capt. Burt says he put the Bessemer's head into the sea and she lay there sufficiently quiet to get the small boat over. They were to the windward of the schooner. He then turned the Bessemer and run to leeward and lay

there heading into the wind until the small boat came alongside. The small boat went up under the lee of the schooner and took the men off one at a time, watching their chance to pull up close and then get away again before they were caught. They had to be very careful not to damage their boat. When they got back to the Bessemer the balance of the crew were standing by, and after getting the rescued men aboard the small boat was hoisted aboard without confusion or any damage whatever. The men who manned the small boat were:

T. J. Coffey, first mate.
Peter Molitor, second mate.
Roy Stafford, able seaman.
Hugh McKechnie, able seaman.
William Collins, able seaman.

The rescued men were in a pitiful condition and could not have hung onto the wreck much longer.

The crew of the Bessemer fitted the rescued men out with dry clothing and a purse was raised for them.

When upbound light for Ashland on Oct. 3, 1911, the steamer Dinkel, Capt. W. J. Hunt, rescued 13 people under the following circumstances:

After passing through considerable wreckage the steamer Hopkins was sighted about 22 miles east of Michigan Island, Lake Superior, with her stern submerged and only 3 or 4 ft. of her smokestack above water. We went over to her, but there was no sign of anybody on her forward. She had distress signals up. Capt. Hunt then sighted the yawl boat running before the sea. It was raining, with a 25-mile southeast wind, and about 35 deg. above. We picked up the yawl boat about 5 miles from the Hopkins. There were 12 men, one woman cook and a dog in the yawl boat, and while they had a new metallic lifeboat and were well fitted out with a can of storm oil, some matches in a bottle and a torch, all they could do was to run before the sea. Capt. Hunt says he got to windward of them and let the dinkey drift down onto them, letting her get in the trough, backing and going ahead on a starboard wheel. They got a line to them and threw over storm oil in pails full until it reached them, and then pulled their boat alongside. The oil killed the sea although the swell was still there. The Dinkey then moved ahead slow on a starboard wheel and poured oil over forward until they were aboard, saving their lifeboat, which they took ashore with them in Ashland. Capt. Hunt had one of the Dinkey's small boats manned and ready, should he need it.

On the night of Oct. 1, 1910, at 10:15 p. m., the steamer Mataafa, towing the barge Alexander Holley, both bound down with iron ore, when about 27 miles S. E. by S. ½ S. of Thunder Bay Island, Lake Huron, wind N. W. strong and big sea, sighted what appeared to be a flare-up on a vessel ahead and off to eastward, which later proved to be the steamer New York.

Capt. H. J. Regan, of the Mataafa, said that on first sight he mistook the flare-up to be the opening and closing of a fire door on a single-deck steamer, but when nearly abreast saw that the steamer was not under control and had fallen off into the trough. Capt. Regan took his steamer and consort a little to the southward before heading for the New York, so as to avoid the trough, and shortly after he had turned around the New York suddenly disappeared. The Mataafa and consort went on up to windward and lay to, using storm oil in the hope of picking up the crew of the New York. The oil drifting down made it possible for the small boats of the New York to get alongside in safety. The Mataafa got a line to one of the boats, and the barge Holley got the other. It took about an hour to get the eight men out of the small boat onto the deck of the Mataafa. The first time the Mataafa turned around she rolled heavily, shifting the tops of ore piled in the hold, and they had to put 2 ft. of water in No. 5 tank on the starboard side to take the list out of her. The next time she turned around in the oil she came around fine. Captain Regan says he does not believe he could have made the rescue successfully without the use of oil.

The steamer Ellwood, upbound, light, passed Point aux Barques, Lake Huron, a little after noon on Oct. 22, 1911. The wind was then blowing a gale from the northwest and Captain Fred Hoffman hauled up into the bay so as to fetch the west shore about Point Sable. About 5 o'clock the water began to smooth and the Ellwood shaped her course for Thunder Bay Island. Shortly after this they sighted a vessel showing a torch about 4 or 5 miles to the eastward of them. The Ellwood watched it for a short time and then decided they were in need of assistance, so they went over and found it was the schooner Naiad in a waterlogged condition. By this time the wind had shifted to the southwest and the vessel was hove to and heading nearly into the wind. Captain Hoffman asked the captain of the schooner what he wanted them to do, and he said to take them off. There was a considerable sea running and Captain Hoffman had some doubt as to whether or not he could get alongside, but by the third attempt he got the Ellwood alongside, and he does not believe they touched the schooner at any time. The Ellwood used the regulation storm oil through the scuppers and poured it over the side, and had lines and ladders all ready, and did not have much difficulty in getting the crew aboard. It was not very cold, probably about 40 or 50 above. By the time the rescue was effected the wind had died out and was not blowing to exceed 25 or 30 miles.

Capt. Hoffman wanted the schooner to give him a line so he could tow her into some harbor and get the vessel out of the way, but the schooner had no towline that would hold and their tow post was gone. They had lost their yawl boat and were pretty anxious to be taken off.

The chief engineers of the fleet met with the officials on Jan. 4, 5 and 6. Most of the time was devoted to the question of fuel.

Average Ore Cargo for 1911

The average ore cargo carried on the great lakes in 1911 was 7,176 tons. This is 23 tons greater than the average cargo carried in 1910, but is 599 tons less than the average cargo carried in 1909, and 1,147 tons less than the average cargo carried in 1908. It is clear that the record of averages made in 1908 is likely to stand for some time. It will be recalled that 1908 was a year of very little movement of ore and that the bulk of the ore was carried in the larger vessels, few of the smaller class being put in commission. Moreover, stages of water were ample during 1908. The period of low water which set in in 1909 still continues so that the larger class of craft were unable to carry maximum loads.

Following are the average cargoes for the past 17 years:

Year.	Gross tons.
1895	1,800
1896	2,202
1897	3,556
1898	3,517
1899	3,803
1900	3,783
1901	4,459
1902	4,899
1903	5,668
1904	5,272
1905	6,101
1906	6,973
1907	7,516
1908	8,325
1909	7,777
1910	7,155
1911	7,178

Commerce of Lake Superior

The statistics of the commerce of Lake Superior, as measured by the canals at Sault Ste. Marie, are now being compiled. The report published herewith shows that altogether 18,673 vessels of 41,653,488 net tons register passed through the canals during the season of 1911. While 11,870 vessels passed through the American canal as against 6,803 for the Canadian canal, the latter carried 30,953,869 tons oi freight, as compared with 22,523,347 tons for the American canal, indicating that the larger class of carrier uses the Canadian canal, owing to the greater draught obtainable. The American canal opened on April 24 and closed Dec. 16. The Canadian canal opened April 22 and closed Dec. 13. The accompanying table gives the comparative statement for the seasons of 1910 and 1911.

Comparative Statement of Lake Commerce Through Canals at Sault Ste. Marie for the Seasons of 1910 and 1911.

ITEMS.		Total Traffic for Season 1910.	Total Traffic for Season 1911.	Increase or Decrease Amount.	Per Cent. Inc.	Per Cent. Dec.
Vessels:						
Steamers	Number	17,674	15,160	2,514		14
Sailing	Number	1,890	1,681	209		11
Unregistered	Number	1,335	1,832	497	37	
Total	Number	20,899	18,673	2,226		11
Lockages	Number	14,569	13,292	1,277		9
Tonnage.						
Registered	Net	49,856,123	41,653,488	8,202,635		16
Freight	Short	62,363,218	53,477,216	8,886,002		14
Passengers	Number	66,933	79,951	13 018	19	
Coal:						
Hard	Short tons	1,658,844	2,060,209	401,365	24	
Soft	Short tons	11,854,883	13,272,667	1,417,784	12	
Flour	Barrels	7,576,789	7,246,495	330,294		4
Wheat	Bushels	86,259,974	97,141,911	10,881,937	13	
Grain	Bushels	39,245,485	40,782,609	1,537,124	4	
Mfd. and Pig Iron	Short tons	444,669	412,269	32,400		7
Salt	Barrels	528,610	661,308	132,698	25	
Copper	Short tons	148,070	132,481	15,589		11
Iron Ore	Short tons	41,603,634	30,731,235	10,872,399		26
Lumber	M. ft. B. M.	603,101	558,513	44,588		7
Building Stone	Short tons	9,635	5,342	4,293		45
General Mdse	Short tons	1,411,549	1,385,918	25,631		2

Average Stay in Lake Ports

Herewith is published a comparative statement for the years 1906, 1910 and 1911, giving the average stay at upper and lower lake ports of the vessels of the Pittsburgh Steamship Co. The showing is quite interesting as revealing the improvement made in dispatch during the past five years. It will be noted that the time of loading and unloading was almost cut in half in 1910, based upon the figures of 1906, and now 1911 has sensibly reduced the time of 1910, proving that the loading and unloading docks are steadily growing in efficiency. The accompanying table gives the particulars.

	Year 1906. Hrs.	Year 1906. Min.	Year 1910. Hrs.	Year 1910. Min.	Year 1911. Hrs.	Year 1911. Min.
Average stay in lower lake ports	36	15	22	22	17	29
Average stay in upper lake ports	22	25	12	22	10	50
Average time spent in port receiving and discharging cargoes	58	38	34	44	28	19
	Gross tons.		Gross tons.		Gross tons.	
Average cargo carried	5,954		6,634		6,306	
Largest cargo carried	13,333		13,296		11,159	
	In 70 min.		In 45 min.		In 25 min.	
Fastest loading record	9,277		9,788		9,362	
	Tons per hour.		Tons per hour.		Tons per hour.	
Rate of fastest loading record	7,288		13,051		22,469	

Obituary

A. Cary Smith, known throughout the world as a designer of fast yachts, died at his home in Bayonne, N. J., on Dec. 9. He was the son of an Episcopal clergyman and was born in Bayonne about 70 years ago. He early turned his attention to yacht designing, turning out his first fast boat, the Comet, in 1860. He worked along original lines and orders came to him fast and in abundance. Robert Center ordered the Vindex, the first iron racing vessel to be constructed in this country. Then came Mischief, the first America's cup defender, followed by Harbinger, Fortuna and Julia, now Iroquois.

When Sir Richard Sutton challenged for the America's cup, in 1885, a syndicate headed by James Gordon Bennett commissioned Cary Smith to build Priscilla, which was beaten by Puritan, and again the next year by Mayflower. After that came the first Intrepid, the two Elminas, Meteor, which was designed for the German Emperor; Yampa, Lasca, Vergemere, Tekla, Azara, Carlotta, Ariel, Katrina, Cinderella; Ailsa Craig and Eronel, the motor boats, and Enchantress, the latter the winner of the King's cup at Newport last fall for William E. Iselin. For Chester W. Chapin, Smith designed more than 30 boats, all of which were successful. He did not confine his attention to pleasure craft, however, for he built and designed the fast Sound steamers, Chester W. Chapin, Richard Peck and City of Lowell, all of which make about 22 miles an hour. Besides this he turned out a number of steamships for the southern trade.

He was elected a member of the New York Yacht Club in 1872, and was No. 21 on the list of members. For many years he took an important part in the councils of the club, particularly in the framing of racing rules and the rules of measurement. He was not only a designer, but, like Nat Herreshoff, tuned up the boats he designed so that they went to their owners in proper trim, ready to do their best. He could see faults in other designs than his own, and his transformation of Colonia, an unsuccessful aspirant for defending the America's cup, from a keel sloop into a centerboard schooner, which won many races, was one of his efforts in this direction.

Cary Smith was a spare man, with quick, nervous movements, and as active a short time before his death as in his early days. He was a vegetarian, and always the subject of remarks from his friends with whom he often lunched, when he would content himself with dry biscuit when they were enjoying some rich repast. He was invariably seasick in rough water, and for that he received little sympathy, as is usual in such cases. His contributions to magazines on yacht building and measurement were many. He was a genial, hearty companion, and a great favorite with all with whom he came in contact.

Rear Admiral Robley D. Evans, known to the nation as "Fighting Bob" Evans, died at his home in Washington on Jan. 3, of acute indigestion. He was born in Floyd county, Virginia, Aug. 18, 1846. In 1859 he decided on a naval career, but there were no Annapolis vacancies from Virginia, his native state. He was proffered the appointment of Utah, however, provided he lived there long enough to establish a legal residence. Evans adjourned to Utah in stage coaches and on horseback and a year later entered Annapolis

as the cadet from that territory. He graduated from Annapolis in 1863 and served in the federal navy during the remainder of the war. He was wounded in the engagements around Fort Fisher. In 1881 he was sent to prevent seal poaching in Bering Sea, which he stopped very effectually. It was at Valparaiso that he acquired the title "Fighting Bob". When the Spanish war occurred, Evans was assigned to the command of the battleship Iowa. His last service was in taking the Atlantic fleet around the world.

William Wallace Bates, former United States commissioner of navigation and a prolific writer on the upbuilding of the American merchant marine, died at his home in Denver, on Sunday, Nov. 27, at the advanced age of 85 years, following a stroke of paralysis. He was the son of a Nova Scotia shipwright, was educated at Calais, Me., and always considered himself to be a citizen of the United States. In 1851, he moved to Manitowoc, Wis., and engaged in ship building, building the schooner Challenge and other vessels. In 1854 he acquired an interest in the Nautical Magazine and Naval Journal, published in New York.. It was while working for this publication that he made a study of the American merchant marine and became ever after a prolific and indefatigable writer on the subject. He favored preferential duties. At the outbreak of the Civil War Mr. Bates joined the Union army. He engaged in ship building and dry dock work in Chicago from 1866 to 1881, preparing meanwhile a book of rules for building lake vessels. He built a dry dock at Portland, Ore., for the Northern Pacific railway in 1881-3. He then became manager of Inland Lloyds, at Buffalo.

President Harrison appointed him commissioner of navigation in 1889 and he served until 1892, resigning on account of ill health. He wrote two books, "The American Marine," in 1892, and "American Navigation" in 1902. In 1897 Mr. Bates organized the American Shipping Society, and was president of the organization at the time of his death. He is survived by two children—Lindon Wallace Bates, the well-known engineer, and Dr. Mary G. Bates, of Denver.

David Kahnweiler's Sons, 260 Front St., New York, have put out a calendar, the pictorial part of which is a panel picture of a young girl. The calendar will be mailed to anyone interested, upon request.

A New Propeller Material

Monel metal, which is a "natural alloy" that is regarded as a successful substitute for steel and bronze, has recently been cast in pieces weighing as much as 25,000 lbs. Most of these large castings have been for propellers that are furnished to the United States government in accordance with standard specifications for this metal. The demand for wheels for this metal is increasing, which is indicative that it possesses unusual qualities that make it extremely suitable for this purpose.

One of the most prominent of the naval vessels that has been equipped with propellers of this metal is the Argentine Republic's huge battleship "Rivadavia", recently launched at the Fore River Shipyard. It has three propellers like those of the other Argentine Republic's battleship Moreno, now in course of construction at Camden, N. J. All are made of Monel metal and three-bladed, each casting weighing 16,000 lbs.

Two spare wheels of 18,000 lbs. each have also been made for the United States battleship North Dakota, while four propellers each weighing 8,000 lbs. have been cast for the Florida. These last are of the three-blade design which is preferred for high-speed vessels, though when the diameter is unduly restricted four or more are used.

Many torpedo boat destroyers are now fitted with Monel metal propellers. The more important of those propelled by a three-bladed design weighing 2,000 lbs. each are the Terry, Roe, Sterrell, Perkins, Walke and Fanning.

Heretofore propellers have been made largely of various kinds of bronze, particularly manganese bronze. The qualities that have made manganese bronze suitable for this use are its ability to resist shock and its resistance to salt water corrosion, but with the rapid development of the marine turbine the demand for a propeller material that would stand even better the severe shocks of high speed service has become manifest. With the idea in view of using Monel metal as a substitute for bronze various tests were made on propellers cast of this material. The results were surprising and at first were thought to be due to increased tensile strength, yield point, and the retention of its high polish without corrosion or pitting, for Monel metal takes a finish like pure nickel. The most probable of these appeared to be the last as the increased tensile strength over that of manganese bronze would only indicate an increase of the factor of safety and resistance to shock rather than resistance to stresses within the elastic limit. Careful experiments with a testing machine on a large number of samples demonstrated that the remarkable results were due to the modulus of elasticity. Manganese bronze has a modulus of elasticity of 13,000,000; Monel metal 22,000,000 to 23,000,000; and steel 28,000,000 to 32,000,000. All metals of course distort inside the elastic limit and recover again when the stresses are removed, but it will be noted that the distortion with Monel metal is less than with manganese bronze. With distortions come changes of pitch and consequent losses of efficiency.

From a practical standpoint the following tests made in duplicate from test pieces cut from one of the blades for one of the 16,000-lb. propellers for the Rivadavia are interesting as showing both the strength and uniformity of this new metal.

Tests on Monel Metal Propellers.

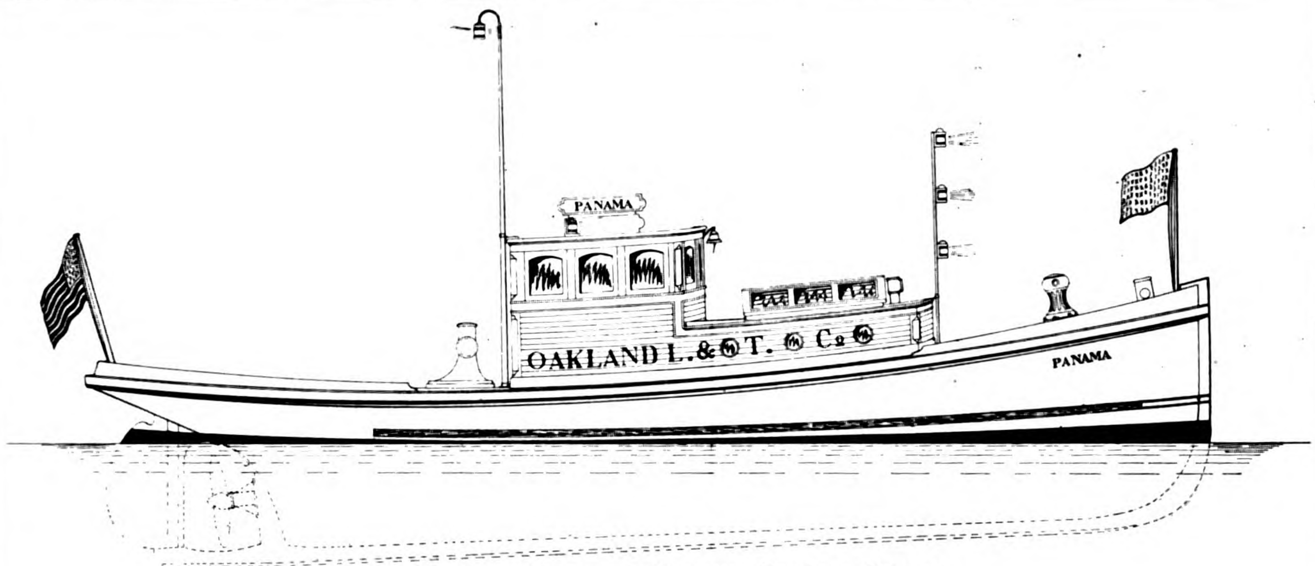
	Yield point lbs. per sq. in.	Tensile strength.	Elongation in 2 in. per cent.
Laboratory of William Sellers, Inc., Philadelphia, Pa.:			
First Blade	38,806	82,580	45
Second Blade	35,820	81,570	45
Third Blade	37,500	86,500	45
Laboratory of the Orford Copper Co., Bayonne, N. J.:			
First Blade	37,500	82,500	45
Second Blade	37,500	82.250	44
Third Blade	37,250	83,500	33

The navy department opened bids for the construction of the battleships Nevada and Oklahoma on Jan. 4. The bidders were the Fore River Ship Building Co., Quincy, Mass., the New York Ship Building Co., Camden, N. J., and the Newport News Ship Building & Dry Dock Co., Newport News, Va. The bids ranged from $5,935,000 to $6,450,000, according to department and builders' desings. Contract has not yet been awarded.

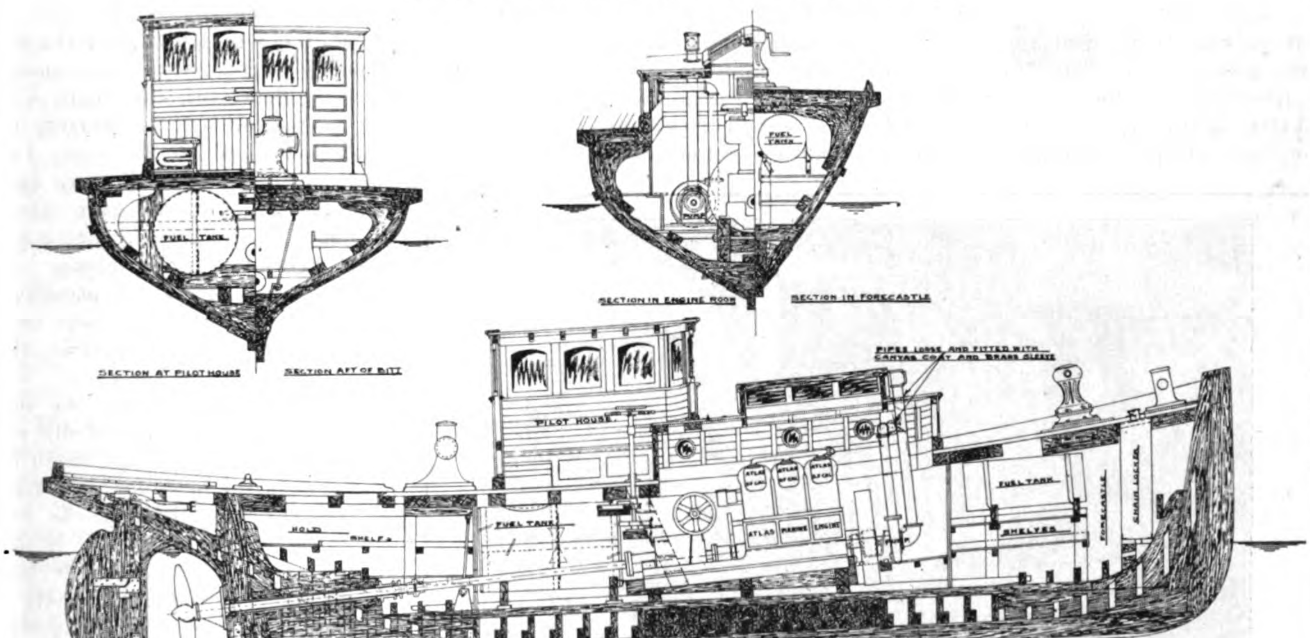
The annual meeting of the Lake Carriers' Association will be held at the Hotel Ponchartrain, on Thursday, Jan. 18. The question of increasing the capital stock of the association from $20,000 to $25,000 will be taken up. The annual dinner of the association will be given at the Ponchartrain on Thursday evening and will be addressed by quite a number of prominent speakers. The Great Lakes Protective Association will meet on Jan. 17.

Gasoline Towboat Panama

The Oakland Launch & Towboat Co.'s single screw, single deck gasoline towboat Panama was launched at the ship yard of M. Anderson, at San Francisco, early last month, and will at once be placed in service handling the larger craft on San Francisco Bay and its tributaries. The Panama was designed by the firm of D. W. & R. Z. Dickie, and is 50 ft. 5 in. overall, has a molded beam of 12 ft. 6 in. and a mean draught of 4 ft. 8 in., with 5 ft. 2 in. depth of hold. It has a straight stem and elliptical stern, with a combined engine and pilot house, the latter aft of the engine



Outboard Profile of Gasoline Towboat Panama



Inboard Profile and Sectional Plans of Gasoline Towboat Panama

room which is entered through pilot house.

The vessel is equipped with an 80-horsepower three-cylinder Atlas marine gas engine, 10½ x 12, turning 280 revolutions. The Atlas auto type steering gear with engine reverse and steering gear led to one stand in the pilot house is used.

The forecastle is used as a boatswain's locker and has no berths for crew. There are combination berths and seats in the pilot house and a berth in the engine room.

The keel is of pine and the shoe of ironbark. The stem and sternpost are of oak. Frames are of pine spaced 14 in. centers and 10½ in. under engine. The deck beams are of pine with 28-in. centers.

The vessel is equipped with a 6-in. Dow centrifugal pump driven by means of friction with the main flywheel.

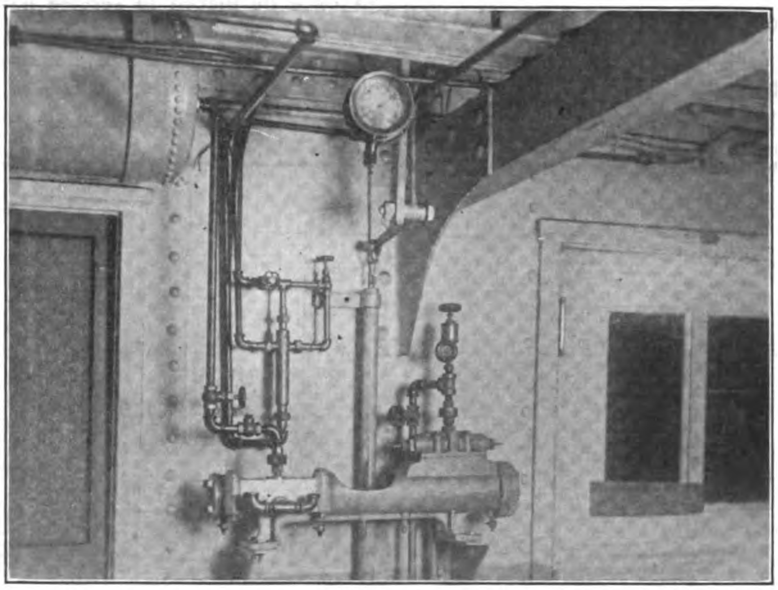


Fig. 2—Air Compressor and Tank

Wheeler Shallow Water Alarm

Editor Marine Review:—Your interest in everything concerning navigation prompts the writer to send you a description of the Wheeler Shallow Water Alarm and the results obtained on the steamer Quincy A. Shaw during the past season as a sounding machine. It is a new invention to obtain a continuous depth of water by means of registering in the pilot house the water pressure at its various depths. The means by which the depths are obtained are simple and as follows: Fig. 1 shows the sounding line wound on its drum. The line is made of metal or rubber hose having a half-inch bore and has a stream of air forced through it coming out at the bottom. The air pressure through the line comes from the air compressor and tank, as shown in Fig. 2. Around this hose or tube is a wire armor having a strength of about seven tons. This armor is protected from wear by chilled iron rings.

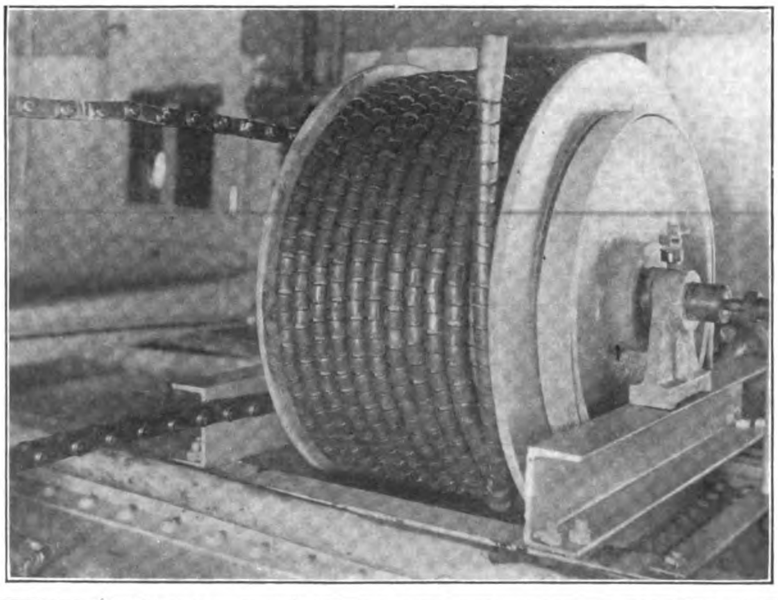


Fig. 1—Showing the Sounding Line Wound on the Drum

The present total length of the line is 330 ft. and weighs a little over a half a ton. The available length of line below the bottom of the boat is 280 ft., and with this out at a speed of 12 miles per hour the lower end will drag at a depth of 77 ft. when loaded to a draught of 18 ft. Therefore the depth under the keel at full speed is always shown if it does not exceed 77 ft. At about half speed the line drops and shows a depth of 115 to 120 ft. and the depth gradually increases as the speed of the boat decreases, the depth of the line in this way in a measure indicating the speed of the boat. Fig. 3 shows the gages or indicators on the pilot house. The large gage indicates the depth by the pressure being transposed into feet or fathoms. The smallest gage shows the pressure on the air tank. The other gage carries the pointer for the electric alarm bell.

This bell can be set to sound an alarm to ring at any depth when approaching water of less depth than is shown on the indicator. We dragged the present line through the rivers and lakes for six trips and it seems to show but little wear. It traced the soundings through the rivers and we frequently proved the accuracy of the machine by casting the hand lead line. At no time did the line catch in dragging it over the bottom to damage or effect its usefulness. The machine picked up the shoaler water on our courses through the lakes and especially the various shoaler places through the Straits of Mackinaw and Green Bay. We often picked up shoaler places than are indicated on the charts.

The shoaler water to the northward of Crisp Point, Lake Superior, was invariably picked up on our course from Manitou Island to Whitefish Point. When the sounding machine did not pick up this shoaler water, we found on making Whitefish Point

that it was because of our being to the northward of the chart course. To obtain these results the machine

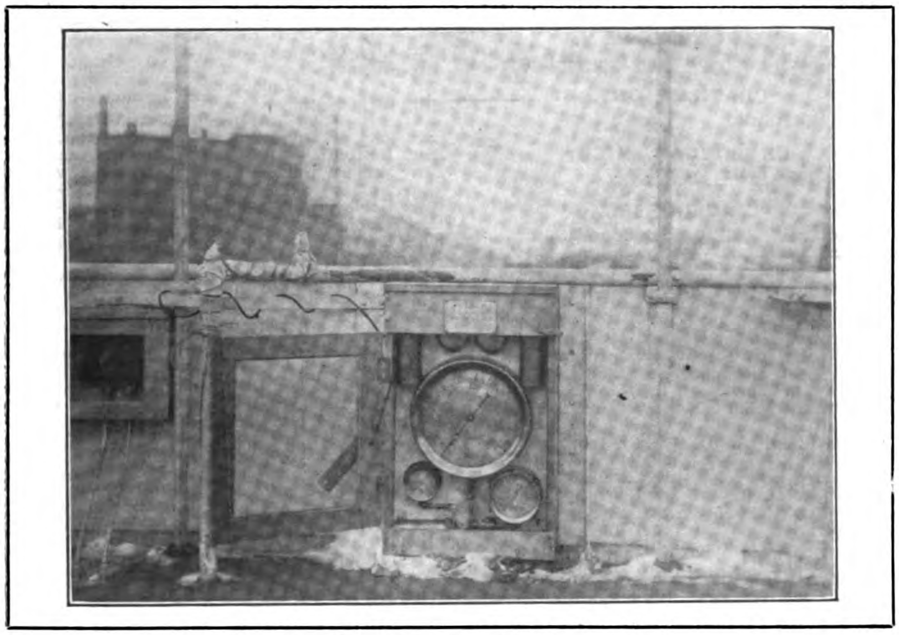


FIG. 3—INDICATORS IN THE PILOT HOUSE

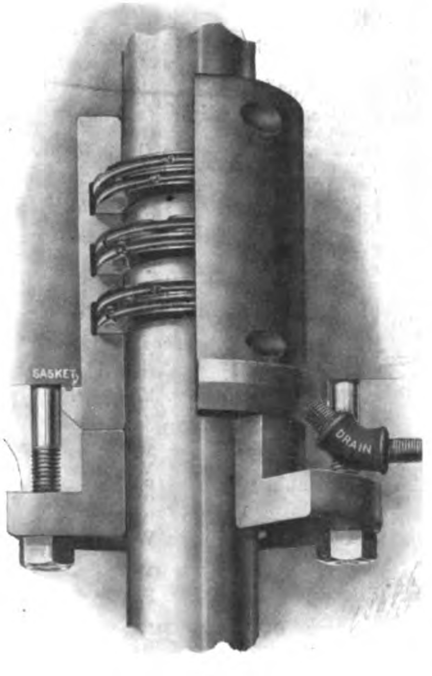
requires proper handling by the navigator, but is not by any means complex and requires but little attention to keep it working properly. The time required is but a few minutes to get the pressure on the air tank and then the line can be instantly dropped giving a continuous sounding. With its proper use, it should be a most valuable aid for safe navigation.

WM. LANGELL.

Metallic Packing

The accompanying illustration shows a metallic packing arranged for marine service by the Metallic Packing & Mfg. Co., of Elyria, O., and it without doubt contains some very valuable features. It will be noted that these packing rings are in a split case enclosed in the stuffing box, and that the regular gland is retained, but does not exert any influence on the packing except to hold the gasket in the outer flange firmly against the face of the stuffing box. Retention of the regular gland in working position seems to give the engineer a greater sense of security, although no case has ever occurred where fibrous packing had to be substituted for the metal parts, but it is plain that this could be done in a very few minutes if it should be necessary. The feature of the small flange intervening between the gland and the stuffing box is unique, and has a number of advantages, the most important being that it allows the use of a properly proportioned drain pipe to take care of condensation; secondly, it brings the gasket where it is readily accessible, and there is no danger of the packing becoming fast in the stuffing box.

The company makes other designs, some of which are also suitable for marine work, and they have been notably successful in making packing where the longitudinal space occu-

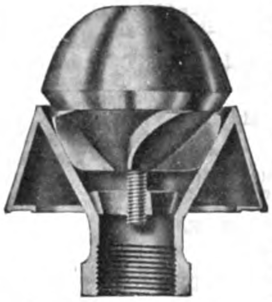


METALLIC PACKING FOR MARINE USE

pied by same is of importance. The fact that they can successfully pack a 6-in. rod by the use of but 3 in. of longitudinal or vertical space would seem to be of special interest to the marine engine designer, as the possibility of either increasing length of the connecting rod or establishing a lower center of stability in the hull is thereby made possible. These packings are made on a definite and well-established principle. Condensation is taken care of in the most simple and effective manner. Steamship companies which have adopted this packing express themselves as being highly pleased with the results obtained.

Patent Flue Cleaner

The Cleveland Flue Cleaner Mfg. Co., 74 Frankfort St., Cleveland, manufacturer of the A & D patent flue cleaner, claim that it is superior to all others for the following reasons: That it is the only cleaner actually giving a perfect spiral motion to the jet of steam



after it leaves the cleaner; that it is always ready for use as it requires no adjustment except to attach the hose; that it is always in order, having no wheels, springs, valves or other complications to get out of order; that the spiral motion of the steam jet is delivered directly against the face of the flue. The company exhibits a number of testimonials to prove the efficiency of the cleaner.

The steamers Harvey D. Goulder and Salt Lake City, of the Acme Transit Co.'s fleet, have been purchased by Capt. James Davidson and Henry B. Smith, of Bay City, and G. A. Tomlinson, of Duluth, for $450,000. The vessels will be managed by Mr. Tomlinson. The Goulder is 525 ft. keel, 55 ft. beam and 31 ft. deep, and was built at Lorain in 1906. The Salt Lake City is 532 ft. keel, 56 ft. beam and 31 ft. deep, and was built in Chicago in 1907. Both vessels were formerly managed by the Hawgoods.

A. T. Kinney, of Cleveland, has purchased the steamer Caldera from the Croxton Steamship Co. The Caldera was built in 1908 at Bay City and is 504 ft. keel, 54 ft. beam and 30 ft. deep.

C. W. Stone has been appointed manager of the lighting department of the General Electric Co.

WINTER MOORINGS OF LAKE VESSELS

ALGONAC, MICH.
Str. Schoolcraft.

ALPENA, MICH.
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Str. Hall, S. C.

ASHLAND, WIS.
Tug Ashland.
Str. Hilton.

ASHTABULA, O.
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Str. Calumet.
Str. Centurion.
Str. Flagg, Geo. A.
Str. French, G. Watson.
Str. Grammer, G. J.
Str. Hebard, Chas. S.
Str. Mills, D. O.
Str. Moore, John W.
Str. Odanah.
Str. Oliver, Henry W.
Str. Paine, Wm. A.
Str. Republic.
Str. Sahara.
Str. Schoonmaker, Col. Jas. M.
Str. Shenango.
Bge. Thompson, A. W.
Str. Warner, R. S.
Bge. Warriner, S. D.
Str. Watson, C. W.
Str. Wilpen.

BAY CITY, MICH.
Tug Breymann, G. H.
Tug Breymann, John B.
Dge. No. 1
Dge. No. 2.
Dge. No. 3.
Tug Shaw, D. C.
Bge. Wright.

BELLEVILLE, ONT.
Sch. Keewatin.

BENTON HARBOR, MICH.
Sch. Bock, Isolda.
Tug Bonita.
Str. City of Benton Harbor.
Str. City of Chicago.
Str. City of Traverse.
Str. Holland.
Str. Puritan.

BIE, P. E. I.
Str. Hackett, J. H.

BOUCHERVILLE, ONT.
Str. Boucherville.
Str. Longueuil.

BROCKVILLE, ONT.
Bge. Georger, F. A.
Str. Marshall, Samuel.
Str. Senator Derbyshire.

BUFFALO, N. Y.
Str. Allegheny.
Str. Bartow, J. H.
Ltr. Batavia.
Str. Berry, B. F.
Str. Berwind, H. A.
Str. Bethlehem.
Str. Binghamton.
Str. Bixby, W. K.
Str. Boston.
Str. Bradley, M. A.
Sch. Brightie.
Str. Brown, J. J. H.
Str. Chemung.
Str. Chicago.
Str. Codorus.
Str. Colonel.
Str. Commodore.
Str. Cornelius, A. E.
Str. Craig, George L.
Str. Davock, Wm. B.
Dge. No. 3.
Dge. No. 5.
Dge. No. 7.
Drill Boat No. 1.
Drill Boat No. 5.
Str. Duluth.
Bge. Francomb, John A.
Str. Gilchrist, J. C.
Str. Hecker, F. J.
Str. Huron.
Str. Ireland, R. L.
Str. Iron King.
Bge. Iron Queen.
Str. Juniata.
Str. Jupiter.
Str. Kensington.
Str. Kopp, J. T.
Str. Lehigh.
Str. Lewiston.
Str. Luzon.
Str. McCullough, John G.
Tug McNaughton, Pliny B.
Str. Maytham, Thomas
Str. Milwaukee.
Bge. Mingoe.
Str. Minneapolis.
Str. Mohawk.
Str. Mohegan.
Str. Moll, C. F.
Str. Munro, J. G.
Str. Niagara.
Str. Northern King.
Str. Northern Light.
Str. Northern Wave.
Str. North Land.
Str. North Star.
Str. North West.
Str. Nyanza.
Str. Panay.
Sch. Peshtigo.
Str. Reis, Wm. E.
Str. Rhodes, Wm. Castle.
Str. Richardson, Granville A.
Str. Rochester.
Str. Rogers, Wm. A.
Str. St. Clair.
Str. St. Paul.
Bge. Scotia.
Str. Senator.
Str. Seneca.
Str. Sinaloa.
Str. Smith, Henry B.
Str. Sonoma.
Str. Sonora.
Str. Squire, F. B.
Str. Starrucca.
Str. Steel King.
Tug Stevenson, Wm.
Str. Superior.
Str. Syracuse.
Tug Tam O'Shanter.
Str. Tionesta.
Str. Tomlinson, G. A.
Str. Truesdale, W. H.
Str. Tuscarora.
Str. Upson, Andrew S.
Str. Walker, P. G.
Str. Wallace, E. L.
Str. Weeks, J. L.
Str. Wickwire, T. H.
Str. Wickwire, T. H. Jr.
Str. Wilkesbarre.
Tug Williams, Charles E.
Str. Woodruff, L.
Str. Yates, Harry.

BYNG INLET, ONT.
Bge. Aloha.
Bge. Wilson, Annabell.

CHARLOTTE, N. Y.
Dge. No. 8.
Tug Temple Emery.

CHATHAM, ONT.
Sch. Hutt, Hattie.

CHEBOYGAN, MICH.
Bge. Bourke, Mary N.

CHICAGO, ILL.
Str. Admiral.
Str. Arizona.
Str. Arlington.
Str. Barth, L. L.
Str. Black Rock.
Str. Brandon.
Str. Brown, Harvey H.
Str. Christie, T. S.
Str. City of London.
Str. City of Paris.
Str. Crerar, John.
Str. Curtis.
Str. Davidson, A. D.
Bge. Delta.
Str. Eddy, Selwyn.
Bge. Filer, D. L.
Bge. Fryer, R. L.
Str. Gilchrist.
Bge. Halsted.
Bge. Harold.
Bge. Hartnell, George E.
Bge. Helvetia.
Str. Howe, George C.
Bge. Hutchinson.
Bge. Interlaken.
Str. Kalkaska.
Str. Kearsarge.
Str. Lagonda.
Str. Lake Shore.
Str. Lambert, John.
Str. McWilliams, J. J.
Str. Major.
Str. Mars.
Bge. Marvin, S. E.
Str. Merida.
Str. Miller, P. P.
Str. Mills, Robert.
Str. Minch, Anna C.
Bge. Mitchell, Forster W.
Str. Mueller.
Str. Neptune.
Str. Nicholas, I. W.
Bge. Norris, A. B.
Str. Ogdensburg.
Str. Oglebay, E. W.
Str. Owen, John.
Str. Pahlow, Louis.
Bge. Peterson, Annie E.
Str. Prentice, J. H.
Str. Ralph, P. J.
Str. Rend, Wm. P.
Str. Russel, G. H.
Str. Saranac.
Str. Saunders, E. N.
Bge. Sawyer, Philetus.
Str. Schuylkill.
Str. Stadacona.
Str. Susquehanna.
Str. Tioga.
Str. Troy.
Str. Underwood.
Str. Utica.
Str. Vail, Walter.
Str. Van Vleck, Geo. H.
Str. Venus.
Str. Wallace, Robert.
Str. Wolf, W. H. (Steel.)

CLEVELAND, O.
Str. Americana.
Str. Andaste.
Bge. Anderson, Alex.
Str. Angeline.
Str. Argo.
Str. Australia.
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Bge. Bottsford.
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Str. Brown, W. L.
Str. Cadillac.
Str. Canadiana.
Str. Castalia.
Bge. Chattanooga.
Str. Choctaw.
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Bge. Donaldson.
Str. Eastland.
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Str. Hemlock.
Str. Hiawatha.
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Bge. Magnetic.
Str. Massachusetts.
Str. Mecosta.
Str. Mills, David W.
Bge. Miztec.
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Str. Nye, Harold B.
Str. Onoko.
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Str. Owego.
Bge. Owen, George B.
Str. Pioneer.
Str. Pontiac.
Str. Rannells, H. E.
Str. Saturn.
Str. Stackhouse, Powell.
Str. Stanton, John.
Str. State of Ohio.
Str. Sullivan, J. J.
Str. Tacoma.
Bge. Tyrone.
Str. Uranus.
Str. Woodford, W. R.
Str. Yosemite.

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Str. City of Midland.
Str. Doric.
Str. Fairmount.
Str. Germanic.
Str. Huronic.
Str. Kenora.
Str. Majestic.
Str. Meaford.
Str. Paliki.
Str. Waubic.
Str. Westmount.
Str. Wexford.

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Str. Britannia.
Str. Filgate.

CUTLER, ONT.
Sch. Allegheny.
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Str. Orr, Arthur.
Str. Orr, George N.

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Bge. Chinook.
Str. Huron.
Str. Idlewild.
Str. Christopher.
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Str. City of Detroit.
Str. City of Mackinac.
Str. City of St. Ignace.
Str. City of the Straits.
Str. City of Toledo.
Str. Detroit.
Str. Eastern States.
Bge. Fassett, T. S.
Str. Gayley, James.
Bge. Godfrey.
Str. Greyhound.
Str. Harvey, Hugh R.
Str. Holland, Robert.
Str. Houghten, H.
Bge. Judd, E. T.
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Str. America.
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Str. Mather, Wm. G.
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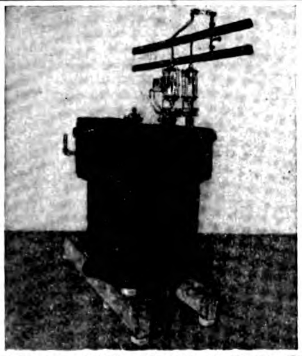
Str. Agwinde.



View of Single Unit I. O. C. Generator for producing Oxygen & Hydrogen

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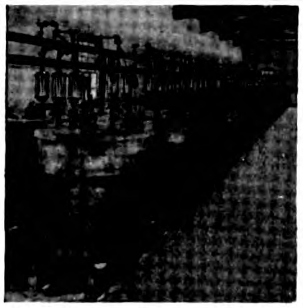

View of Double Row Installation of I.O.C. Generators for producing Oxygen & Hydrogen

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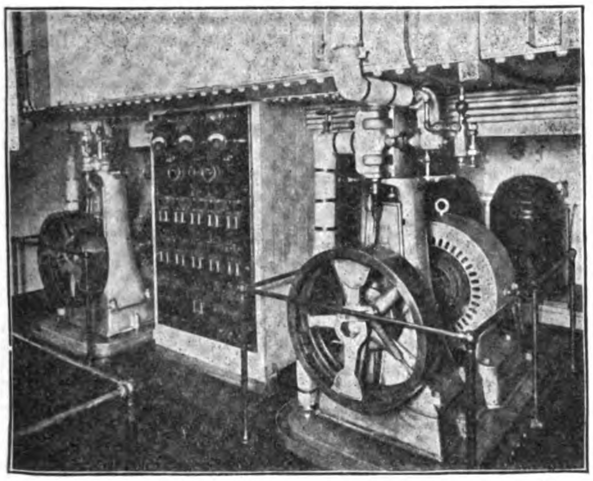

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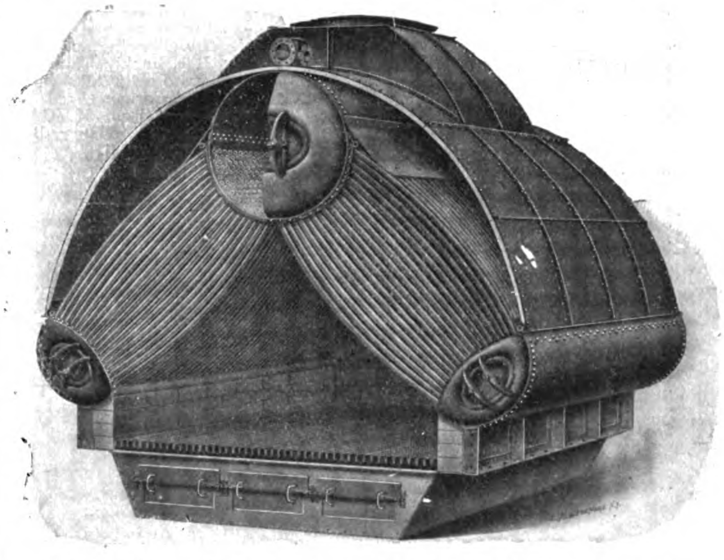

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Str. Caspian.
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Bge. Cobourg.
Bge. Condor.
Bge. Cornwall.
Bge. Coteau.
Bge. Dakota.
Str. Donnelly.
Bge. Dorchester.
Bge. Dunmore.
Tug Emerson.
Bge. Ethel.
Sch. Ferry, Major N. H.
Sch. Ford River.
Bge. Gaskin, John.
Tug Glide.
Tug Hall, Mary P.
Bge. Hamilton.
Bge. Hector.
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Bge. Huron.
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Bge. Jennie.
Str. Keystorm.
Str. Keywest.
Bge. Kildonan.
Bge. Kingston.
Bge. Lapwing.
Sch. Ferry, Major.
Sch. Maize.
Bge. Mamie.
Tug Mary.
Bge. Melrose.
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Str. Rideau Queen.
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Tug Thompson.
Tug Thomson, D. G.
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C. F. Pere Marquette 7.
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Str. Sheboygan.
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Str. Wright, A. P.

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Bge. Uranus.

MARINETTE, WIS.

Yt. Bonita.

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Str. United States.

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Tug Magnolia.
Str. Midland King.
Str. Rosedale.
Tug Traveler.

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Str. Bransford.
Str. Carnegie, Andrew.
Str. Champlain.
Bge. Chickamauga
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Str. Kirby, S. R.
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Bge. Maitland, Alexander.
Str. Manchester.
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Str. Mitchell, Samuel.
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Str. Norton, D. Z.
Str. Omega.
Str. Pathfinder.
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Str. Polynesia.
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Bge. Sagamore.
Str. Salt Lake City.
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Str. Taylor, Moses.
Str. Topeka.
Str. Tower, C.
Str. Umbria.
Str. Upson, J. E.
Str. Utley, E. H.
Str. Vermillion.
Str. Volunteer.
Str. Vulcan.
Str. Wade, J. H.
Str. Wallula.
Str. Whitaker, Byron.
Str. Wilson, Capt. Thomas
Str. Wisconsin.
Str. Yuma.

MONTREAL, QUE.

Str. Cardinal.
Str. City of Montreal.
Str. City of Ottawa.
Str. Empress.
Str. Princess.

MUSKEGON, MICH.

Sch. Davis, Lyman M.
Str. Markham, George C.
Str. Stephenson, S. M.
Str. Wilson, Mathew.

NORTH TONAWANDA, N. Y.

Str. Bradley, C. H.
Str. Clyde
Sch. Delaware.
Str. Eddy, J. F.
Bge. Edwards, J. R.
Str. Fleetwood.
Bge. Genoa.
Sch. Goshawk.
Str. Green, C. H.
Bge. Moravia.
Str. Myron.
Bge. No. 118.
Bge. No. 130.
Bge. No. 131.
Bge. No. 133.
Str. Oceanica.
Bge. Orton, M. E.
Bge. Our Son.
Str. Packer.
Sch. Page, Marion W.
Str. Pawnee.
Bge. Pennington.
Str Veronica.
Sch. Woolson, Mary.
Str. Zillah.

OGDENSBURG, N. Y.

Str. Averell.
Str. Avon.
Str. Bennington.
Bge. Buckly, James.
Str. Burlington.
Bge. Carney, Fred.
Str. Dalton, H. G.
Str. Hall, Henry B.
Str. Haskell.
Bge. H. B.
Str. Hecla.
Bge. Hoboken.
Bge. Ireland.
Str. Langdon.
Bge. Lyon, Mary.
Str. McVittie, A.
Bge. Mathews, Jennie.
Bge. Menominee.
Str. Mercur, Fred.
Bge. Middlesex.
Str. Morley, W. B.
Tug Myra.
Str. Nicaragua.
Str. Nipigon.
Str. Phenix.
Tug Proctor, W. L.
Str. Rugee, John.
Str. Rutland.
Tug Seymour, Geo. D.
Bge. Sherman, W. A.
Bge Stephenson, Isaac.
Bge. Twin Sisters.
Bge. Witbeck, Henry.

OSWEGO, N. Y.

Str. Parent, S. N.

OTTAWA, ONT.

Str. Hall.
Str. Ottawan.
Str. Roberval.
Str. Scotsman.

OWEN SOUND, ONT.

Str. Alberta.
Str. Algonquin.
Str. Assiniboia.
Str. Athabasca.
Str. Caribou.
Str. Crawford.
Str. Crowe, G. R.
Str. Iroquois
Str. Keewatin.
Str. Manitoba.
Str. Manitou.
Str. Matthews, W. D.

PENETANGUISHENE, ONT.

Str. Chamberlain, C. W.
Str. Wahnapitae.

PICTON, ONT.

Str. Aberdeen.
Str. Aletha.
Str. Alexandria.
Str. Brockville.
Str. Canna.
Str. Geronia.
Str. Porter, Lloyd S.
Bge. Reid, Isabel.
Bge. Rob Roy.
Str. Water Lily.
Str. Wherenow.

POINT ANNE, ONT.

Bge. Antelope.

POINT EDWARD, ONT.

Str. Donnacona.
Str. Glenellah.
Sch. Sephie.
Sch. Tolmie.
Str. Waheondah
Str. Winona.

PORTAGE, MICH.

Bge. Aurora.
Str. City of Berlin.

PORT ARTHUR, ONT.

Str. Adams, Thomas.
Str. Barlum, Thomas.
Str. Corunna.
Str. Hutchinson, Chas. L.
Str. Jaques, C. S.
Str. Meacham, D. B.
Str. Nevada.
Str. Peavy, Frank H.
Str. Regina.
Str. Renvoyle.
Str. Shaughnessy, Sir Thomas.

PORT COLBORNE, ONT.

Str. Emperor.
Str. Midland Prince.

PORT CREDIT, ONT.

Tug Roy Mac.

PORT DALHOUSIE, ONT.

Str. Dalhousie City.
Str. Garden City.

PORT HOPE, ONT.

Sch. Arthur.
Sch. Mowet, Oliver.

PORT HURON, MICH.

Str. Bielman, C. F.
Str. Britannic.
Str. Ford, J. C.
Str. Groh, Mary.
Ltr. Howland, Thomas.
Str. Jenkins, C. O.
Str. Lakeland.
Str. Linden.
Bge. McLachlan, Mary E.
Str. Minnekahta.
Str. Minnetonka.
Tug Pallister.
Str. Ross, M. M.
Str. Sill, H. S.
Str. Sultana.

PORT STANLEY, ONT.

Str. Empress of Midland.

QUEBEC, P. Q.

Bge. A. D.
Str. Carleton.
Bge. Ewen, Frank D.
Str. Florence.
Bge. Gladys H.
Str. Hackett, Wm.
Bge. Katie H.
Bge. Klondyke.
Str. Sinbad.
Str. Tadousac.
Str. Zapotec.

RIVER ROUGE, MICH.

Tug Kinch, Wm. H.
Tug Lee, Fred A.
Yt. Logan, Wm. (Gas.)
Tug Meldrum, H. A.
Dge. No. 1.
Derrick Scow No. 5.
Dge. No. 12.

SARNIA, ONT.

Str. Bothnia.
Sch. Cataract.
Str. City of Genoa.
Sch. Corisande.
Str. Glenellah.
Str. Hamonic.
Str. Imperial.
Str. Impoco.
Str. Ionic.
Bge. No. 41.
Str. Saronic.
Str. Waheondah.

SAGINAW, MICH.

Bge. Cahoon, T. H.
Str. Flora.
Bge. Holland, N. C.
Bge. Jackson, G. K.
Str. Langell Boys.
Str. Warren, Homer.
Bge. White & Friant.

ST. CLAIR, MICH.

Bge. Barlum, John J.
Str. Boyce, Isabella J.
Bge. Iron Cliff.

ST. IGNACE, MICH.

Str. Algomah.
Str. City of Cheboygan
Str. St. Ignace.
Str. Sainte Marie.
Str. Waukon.

SANDUSKY, O.

Bge. Abyssinia.
Str. Boeckling, G. A.
Str. Brokate.
Str. Chisholm, Alvah S Jr.
Str. Clinton.
Str. Columbus.
Bge. Cutler, D. G.
Str. Gowen, A. Y.
Bge. Kelley, Norman
Str. Mary H.
Bge. Moran, David.
Str. Olcott.
Bge. Pellett, James H.
Str. Recor, E. P.
Tug Sanders, W. B.
Str. Wehrle, A. Jr.

SANDWICH, ONT.

Str. Case.
Str. Harper, John.

SAUGATUCK, MICH.

Str. Tennessee.

SAULT STE. MARIE, ONT.

Tug Commodore.	Str. Leafield.
Str. Drummond, Thomas J.	Str. Michipicoten.
Tug Emerson, George.	Str. Moore, C. W.
Tug Hall, Jessie.	Tug Reliance.

SHEBOYGAN, WIS.

Str. America.	Str. Chipman, Susie.
Str. Brazil.	Str. Reiss, John P.
Str. Buckley, Edward.	

SOREL, QUE.

Str. Berthier.	Str. Saguenay.
Str. Montreal.	Str. St. Irenee.
Str. Murray Bay.	Str. Terrebonne.
Str. Quebec.	Str. Three Rivers.
Str. Rapids Prince.	

SOUTH CHICAGO, ILL.

Str. Augustus, A. A.	Str. Mauch Chunk.
Str. Butler, Joseph G. Jr.	Str. Mullen, Martin.
Str. Cuddy, Loftus.	Str. Stadacona.
Str. Kennedy, Hugh.	Str. Waldo, L. C.
Str. McIntosh, H. P.	Str. Williams, George F.
Str. Mack, Wm. Henry	Str. Wood, J. B.

SUPERIOR, WIS.

Str. Caldera.	Str. North Lake.
Str. England, R. W.	Str. North Sea.
Tug Ferris, Charles.	Str. North Wind.
Str. Hanna, L. C.	Str. Wells, Frederick B.
Tug Meyer, John E.	Str. Western Star.
Str. Minch, Philip.	Str. Wood, Joseph.
Str. Morrell, D. J.	
Str. Northern Queen.	

THOROLD, ONT.

Str. Strathcona.	Str. Yorkton.

TOLEDO, O.

Bge. Chippewa.	Str. Hanna, M. A.
Str. City of Mt. Clemens.	Str. Holden, H. S.
Str. Commerce.	Str. Laura D.
Tug Dexter.	Bge. Rust, David W.
Str. DoVille, R. E.	Bge. Santiago.
Str. Dussault.	Str. Saxona.
Str. Ella G.	Tug Shelby, Edward.
	Str. Walter D.

TONAWANDA, N. Y.

Bge. Ashland.	Str. Noble, Benjamin.
Bge. Case, J. I.	Str. Oscoda.
Str. Cherokee.	Bge. Redfern, C. E.
Bge. Connelly Bros.	Str. Sawyer, W. H.
Str. Harlow.	Str. Stafford, W. R.
Str. Hines, L. Edward.	Bge. Tuxbury, A. C.
Sch. McWilliams, Ed.	Str. Viking.
Str. Niko.	Str. Winnipeg.

TORONTO, ONT.

Str. Arabian.	Tug King, Earl.
Str. Argyle.	Str. Kingston.
Str. Belleville.	Str Locke.
Str. Bickerdike.	Str. Macassa.
Tug Bly, Nellie.	Tug Maxwell.
Str. Cayuga.	Tug Minnitage.
Str. Chicora.	Bge. Muir, A.
Str. Chippawa.	Tug National.
Bge. City of New York.	Str. Angiara.
Tug Clark Bros.	Tug Rat.
Bge. Commodore Jarvis	Bge. Recruit.
Str. Congercoal.	Str. Rolph.
Str. Corona.	Tug Russell, John E.
Sch. Echo.	Bge. Seguin.
Tug Fraser, B. M.	Tug Sir John.
Str. Haddington.	Str Sligo.
Sch. Hope.	Tug Stanton, Roy.
Sch. Island Queen.	Str. Toronto.
Str. Juno.	Str. Turbinia.

TROIS RIVIERE, QUE.

Bge. Warmington, G. H.

WASHBURN, WIS.

Str. Ranney, Rufus P.

WAUKEGON, ILL.

Str. Corrigan, James.

WELLS, MICH.

Str. Stephenson I. Watson.

WIARTON, ONT.

Sch. Herschel.	Str. Scott, Thomas R.
Sch. Sands, Isabella.	

WINDSOR, ONT.

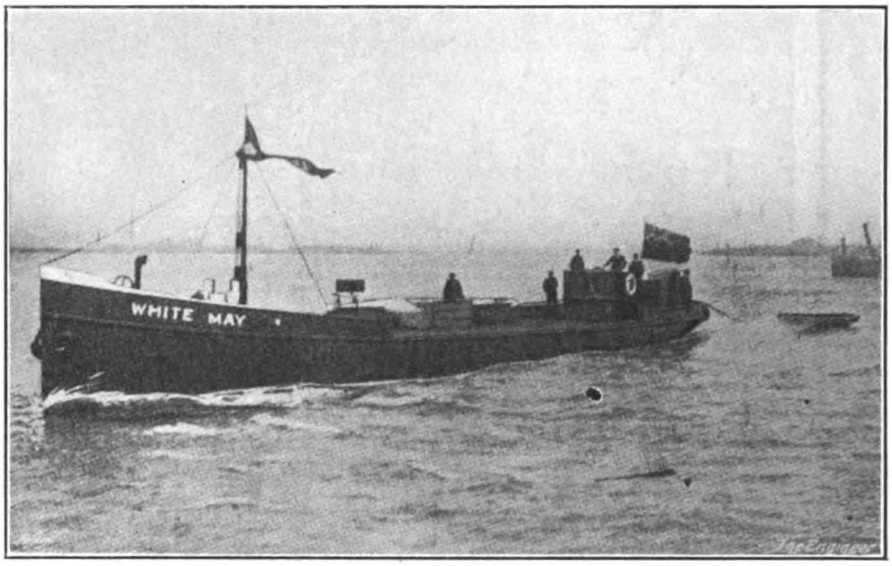
Str. Britannia.	Str. Sappho.
Str. Columbia.	Str. Ste. Claire.
Str. Garland.	Str. Transfer.
Str. Pleasure.	Str. Transport.

Petrol-Driven Tank Barge

A demonstration run was given on the Thames recently of a petrol-driven tank barge intended for carrying oil in bulk. This vessel, a general view of which is shown in Fig. 1, has been supplied to the requirements of the British Petroleum Co., Ltd.

Overall the hull measures 105 ft. in length, the beam being 17 ft. 9 in., and the depth 6 ft. The oil is carried in three compartments, each compartment being divided into two portions by a central longitudinal wash bulkhead. At the forward end of the range of tanks, a double bulkhead forming an air cofferdam, about 2 ft. 6 in. in thickness separates, for safety purposes, the crew's cabin in the forepeak from the oil tanks. A similar cofferdam is interposed between the oil tanks and the engine room at the after end. The plating throughout is 5/16 in. thick. Should occasion require it the vessel can carry 130 tons of bulk oil. More usually 100 tons is about her working load. With this amount in the tanks the draught is 4 ft. 9 in. For discharging the vessel the pump and appliances situated at the Petroleum Co.'s wharves and jetties are used, no provision being made on board the barge itself for this purpose beyond the necessary cocks on the expansion chambers of the tanks.

The propelling machinery consists of a 76 B. H. P. Kromhout marine oil engine. The fuel used under ordinary circumstances is paraffine, but at starting a measured quantity of petrol is introduced into the vaporizer. By the time this is used up, the paraffine is ready to take its place and the vaporizer is hot. The feature of the arrangement is that no petrol is carried below deck. A petrol reservoir is provided on the deck, and from this only just that amount of petrol can be drawn at any one time which is sufficient to start the engine. The engine drives on to the propeller shaft through epicyclic gearing, the control of which is obtained from the bridge. In this way, stopping, reversing, or changing speed can be effected without the presence of one of the crew in the engine room. A crew of three is thus sufficient to manage the boat. Considering the class of labor operating the boat, this is highly desirable.



PETROL-DRIVEN TANK BARGE ON THE THAMES

Throughout the whole design of the engine and its accessories the makers have striven for simplicity and the reduction of complication in all details. All fittings not absolutely essential have been omitted, and although this may be done at the expense of theoretical efficiency, the makers claim that the practical benefits derived more than outbalance any small loss arising from the design to make the engine as simple as possible.

The cylinders are two in number, and have a bore of 11 13/16 in., with a stroke of 14 15/16 in. On a speed of 7.35 knots, the consumption of paraffine was 57 pints per hour. As the fuel used costs in bulk about 4d a gallon, it will be seen that with the above speed the cost for fuel works out at about 2s 4½d an hour. The weight of the engine with reverse gear is 8,200 lbs., the complete machinery equipment, including shafting, propeller, tanks, etc., weighing 10,400 lbs.